DOCUMENT RESUME

ED 040 716 LI 002 015

TITLE	EUDISED: European Documentation and Information System for Education. Volume II, National Reports.
INSTITUTION	Council of Europe, Strasbourg (France). Documentation Center for Education in Europe.
PUB DATE	69
NOTE	110p.
EDRS PRICE	EDRS Price MF-$0.50 HC-$5.60
DESCRIPTORS	*Automation, Computer Oriented Programs, Documentation, *Education, *Foreign Countries, *Information Centers, Information Systems, International Organizations, International Programs, *National Programs
IDENTIFIERS	*Documentation Centre for Education in Europe

ABSTRACT

This study briefly describes the documentation and information projects of seven nations, stressing their use in the field of education. The sections are: (1) automated documentation and the human sciences in France, (2) documentation for education and the social sciences in the Federal Republic of Germany, (3) mechanized projects in library work in the Netherlands with particular reference to education, (4) social science documentation in Sweden with emphasis on education, (5) documentation of education in the United Kingdom with an account of other semi-mechanized and mechanized systems of interest, (6) educational documentation and information systems and networks in the USA and (7) documentation and information in the USSR. Short resumes of the authors of the chapters are appended. (NH)

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ED0 40716

EUDISED

EUROPEAN DOCUMENTATION AND INFORMATION SYSTEM FOR EDUCATION

Volume II

NATIONAL REPORTS

LI 002 015

DOCUMENTATION CENTRE FOR EDUCATION IN EUROPE

Editor :
Director of Education
and of Cultural and Scientific Affairs
Council of Europe
STRASBOURG
1969

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AUTOMATED DOCUMENTATION AND THE HUMAN SCIENCES IN FRANCE

by *C Bonnefoi*

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This paper is available in the original French on application to the Secretariat.
Cette étude est disponible dans sa version originale (français) auprès du Secrétariat.

ref. DECS/Doc (69)14

1. WHAT IS AUTOMATIC DOCUMENTATION?

As we were reminded by a well known specialist (1) at the *4th International Congress of Cybernetic Medicine* held at Nice in September 1966: "The essential problem of documentation is in fact that of 'memorising' particulars of texts and of selecting those documents that contain the answer to any given question by applying logical criteria. Computers are capable both of memorising and of logical selection and therefore seem suitable for automatic documentation".

Automatic documentation defined in this way has long ago passed beyond the experimental stage and is replacing conventional techniques of documentation in many documentation centres all over the world.

It is now established that certain documentary operations hitherto carried out manually can be performed by machines. These comprise primarily the automatic memorising of data as well as the - likewise automatic - selective retrieval and print-out of bibliographical references, lists, catalogues and indexes classified in accordance with criteria corresponding to a given question.

In France, many such projects have already been carried to an advanced stage in industry, technology and business.

Likewise in the exact sciences (mathematics, physics, chemistry), and in the biological and medical sciences and their applications, documentation work has gone over in varying degrees to the use of computers for data processing (2).

The reasons for the adoption of new techniques in document processing are well enough known, namely that the operations of registering, memorising, selecting and distributing information are becoming increasingly complicated owing to the continued proliferation and diversification both of the information itself and of its documentary vehicles. We can understand the interest aroused by the new methods and the success they have attained in fields of documentation where their use provides assurance of increased efficiency and speed.

2. DISTINGUISHING FEATURES OF THE HUMAN SCIENCES

Unfortunately this cannot be said of documentary work in the field of human sciences. Why is this? The following hypotheses may perhaps be put forward:

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(1) Levery, Francois, La Documentation Automatique.
(Paper presented at the 4th International Congress of Cybernetic Medicine)
In *Cybernetica* (Namur), vol. IX, no. 3, 1968, pp. 179-90
(Mr. Levery is Scientific Adviser to IBM-France, Paris)

(2) On this matter reference may be made to the following publications:

- L'Automatisation documentaire en France: Méthodes, expériences, réalisations.
- In *Documentaliste* (Paris), no. spécial, 1er trim. 1966, 135 p.
- Information scientifique et technique: Liste de quelques services documentaires mécanisées.
- In *Bulletin des bibliothèques de France* (Paris). 13th year, no. 11, Nov. 1968, pp. 435-488.

Whereas in the industrial, technological and commercial sectors, as in the exact, biological and medical sciences, the economic motive is one of the main factors influencing developments - for it is more and more essential to be informed and documented as rapidly and completely as possible about scientific and technical studies and innovations, which condition productivity and economic progress - this is not true of the human sciences. The latter are more disinterested, being mainly directed towards theoretical research, and their immediate practical applications, where they exist, are somewhat remotely related to the concepts of economic return and profit.

Furthermore, the conceptual boundaries of the exact, biological and medical sciences and their applications can be demarcated rather sharply (a fact which everybody recognises in their terminology) but the scope of human sciences seems more difficult to define as they tend more to be interdisciplinary. The consequence is that for their purely technical documentation the human sciences encounter greater obstacles in changing over from the conventional to the automatic stage.

This suggests why documentary activity in the human sciences is advancing more slowly and more hesitantly, and why documentation centres specialising in human studies lag far behind others in the adoption of automatic methods.

Nevertheless, documentation centres which specialise in the human sciences face the same problems of document processing as the others.

In this paper an endeavour is made to compile as complete and accurate an inventory as possible of those in France that have taken up the question of automatic documentation. In point of fact, applications of the new documentation techniques to the human sciences have reached a more or less advanced stage in projects either current or completed.

3. THE HUMAN SCIENCES AT THE CNRS

Only one documentation centre in France deals with all the disciplines comprised within the wide spectrum of the human sciences, ranging from the classics, philosophy and history to the most varied social sciences - sociology, ethnology, law, etc. This is the *Centre National de la Recherche Scientifique* (at 15 Quai Anatole France, Paris 7e), whose documentation service collects and exploits original scientific literature of international value, whether published in France or elsewhere.

The prime purpose of this documentation centre is to provide research workers in laboratories and research establishments specialising in the human sciences with the material needed for them to follow the development of their respective fields of activity, in the same way as workers in the other sciences and technical fields. For this purpose, it collects in its library all the more important scientific periodicals (totalling 3,500 for the human sciences) as well as French university theses, the proceedings of national and international conferences and technical reports.

Some of the periodicals received in the library are, at the same time, abstracted and referenced for mention in specialised bibliographies which are known as *Bulletins signalétiques*. In the case of the human sciences these bulletins are published quarterly under the following titles:

- *Psychology. Psychopathology* (monthly).
- *Philosophy. Religious sciences.*
- *Education.*
- *Sociology. Ethnology. Pre-history and archaeology.*
- *History of science and technology.*
- *History and science of literature. Dramatic arts.*
- *Linguistic sciences.*

This documentary material is supplemented by various yearbooks and monographs (*Annuaire de Législation française et étrangère, Annuaire français de droit international,* etc.). A retrospective bibliographical search for the documents referenced is made possible through the provision of subject and author indexes, with lists of the long and short titles of the periodicals abstracted.

Up to the present these bulletins, yearbooks and indexes have been compiled manually on the basis of conventional catalogue cards and have been printed by traditional methods. These methods result in a long time lag (of two years or more) between the publication of a source document and that of its description in the bulletin.

The centre also operates a reproduction service which supplies users, on request, with photocopies of the documents stored. This service is very active, as is the translating service which likewise works in response to users' requests.

It will be noticed that the documentation centre of the CNRS performs two major functions:

- Supplying information about documents
- Supplying the documents themselves (or translations)

It is with this double commitment in view that the documentation centre decided to transform its working methods during the next few years in order to accelerate the supply of information, to "personalise" it and to keep pace with the growth in volume of documentary material. It is planned to carry out, by 1972, a gradual replacement of the *Bulletin Signalétique* by an automated bibliographical service whose function will be to "memorise" the documents, to publish highly specialised monthly bibliographies, adapted to users' particular needs, by mechanical means and to supply retrospective bibliographies relating to specific subjects on request. It will also be possible through these arrangements to carry out collated studies.

An automated bibliographical service being set up for this purpose, in the field of chemistry documentation, is still in the experimental stage.

Automated Bibliographies

The equipment being used for the current experiment in automation is that of the CNRS Computing Centre which is installed in the premises of the Institut Blaise Pascal. It includes the following group of machines: an IBM 360/60 computer (with a storage capacity of 512,000 characters) and two IBM 1401 computers (with 16,000 position storage). A larger machine is being acquired which will be connected to a number of terminals at various points in the Paris area; it will be installed in the CNRS buildings at Orsay and will be used partly for research and administration, partly for documentation.

From the CNRS projects now being studied it is not yet possible to determine which of the operations needed for document processing will need to be given priority for automation. The most advanced of the projects seems to be that of automatic photo-typesetting, or computer-aided printing, for bibliographical reference lists, bulletins, indexes etc. Three types of equipment that could be connected to the computer for this purpose are now under consideration, namely:

- a photo-typesetter based on an optical system
- an electrical flash photo-typesetter
- a fully electronic photo-typesetter
- Microfiches

The second group of modernising projects relates to the preservation and reproduction of documents for the purpose of communicating them to users on request.

As already stated, the CNRS Documentation Centre now processes 3,500 periodicals for the human sciences alone, which means, among other things, that this material occupies a floor area of 1,800 sq. m. Not all of the articles that appear in the 3,500 periodicals are either abstracted or used, so that much of this floor space is completely wasted. Further, the operations involved in searching for a requested document are very extensive and involve repeated "writings" (reproduction of the various bibliographical elements such as title, author, place etc.) in the course of which errors are not impossible.

In order to overcome these difficulties the CNRS Documentation Centre is now considering the adoption of a microfiche system which it is thought, would be the best answer at present to the problem of introducing greater mechanisation into the chain of documentary operations. Apart from its small size (permitting considerable saving of space) and its standardisation of format (which allows for rational filing), the microfiche requires only a single titling and indexing operation. Further, it ensures the accurate reproduction of its constituents for a wide variety of uses: reproduction of the references either alone or together with the related indexing or summaries, preparation of bulletins, lists, etc, or reproduction of the original document on request.

If, in addition, the microfiches are serially numbered, they are ready to be used as "entry grids" for the automated processes of memorising and selection.

Operational in 1972 ?

Such are the projects now under consideration at the CNRS Documentation Centre. As already remarked, they are not yet at the stage of action but rather at that of thinking, and they will not enter the operational phase before 1972.

Moreover these projects do not concern only documentation for the human sciences; they apply to the whole range of scientific and technical documentation handled by the Documentation Centre of the CNRS. The share of the human sciences cannot be distinguished, particularly as the department of human sciences is likely to be transfered from the CNRS to another organisation for scholarship and research, the *Maison des Sciences de l'Homme* which is now being reorganised (3).

4. ETHNOLOGY

It may be useful at this point to mention an experiment in the computer processing of documentary information which was carried out a few years ago at the *Centre d'Analyse et de Recherche Documentaires pour l'Afrique Noire,* known as CARDAN (4).

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(3) The new building designed to accommodate the various sections of the Maison des Sciences de l'Homme, which are now scattered over Paris, is under construction in the Rue du Cherche-Midi, Paris.

(4) Formerly known as CADAN (Centre d'analyse documentaire pour l'Afrique noire), this institution was set up in 1961 as part of the Centre d'études africaines de l'École pratique des hautes études which is located in the Faculty of Letters and Human Sciences at Nanterre.

The general principles of this undertaking have been framed by the *Service for Symptomatological and Documentary Studies* jointly with the *Automatic Documentation Section* of the CNRS, both of which organisations are run by Mr. Jean-Claude Gardin (5).

The experiment was started on the basis of documents (periodicals, books, reports, etc.) relating to African studies, its purpose being to constitute and then test a standardised documentary language which would enable documentary research to be automated by means of a computer.

It continued for four years, from 1961 to 1965. The conceptual coverage of the language extends to various human sciences ranging from ethno-sociology to psychology and physiology. The language as such is embodied in a classified and hierarchically arranged dictionary, with a syntax or body of rules for its use. It thus involves not only keywords classified in homogeneous lexical categories but also relationships between the keywords. In some cases the relations are implicit or paradigmatic (inter-relations between keywords of the same class, vertical relations for instance) while in others they are explicit or logical, between what have been called syntagmatic keywords. The latter are divided into four categories: predicative, associative, consecutive and co-ordinative.

The abstracting of documents was carried out in four stages:

Each basic document was subdivided into "semantic units" (*unitées de signification*), i.e. into as many central themes as were dealt with in the original text.

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(5) Mr. J.-C. Gardin, now director of the Archaeological Documents Analysis Centre of the CNRS, is one of the best known French theorists of automatic documentation. He has already carried out a number of projects, besides which he is the author or co-author of some very penetrating studies among which the following may be mentioned:

- Cros R.C., Gardin J.-C., Lévy F. - L'automatisation des recherches documentaires. Un model général "Le Syntol" - Paris, Gauthier-Villars, 1964.
- L'organisation de la documentation scientifique. - Studies by J.-C. Gardin, E. de Grolier, F. Lévery and the Association nationale d'études pour la documentation automatique (ANEDA) - Paris, Gauthier-Villars, 1964.
- Alouche F., Bély N., Cros R.-C., Gardin J.-C., Lévy F. and Perriault J. - Economie générale d'une chaîne documentaire mécanisée. - Paris, Gauthier-Villars, 1967.

(Through the *Archaeological Documents Analysis Centre*, Mr. J.-C. Gardin is at present engaged on a Ministry of Cultural Affairs project. Although this is not document processing proper, it is interesting that the Ministry contemplates using a computer to maintain an inventory of matters under its care, such as historical monuments and sites, archaeological and artistic treasures in museums, archaeological excavations.)

These semantic units were then condensed or summarised in such a way as to bring the central core and main sections of the study into relief.

Finally, these summaries were translated into the documentary language in the form of "diagrams" of interconnected terms, these diagrams being recorded in the computer.

The same process of abstracting,translation and recording was likewise applied to the questions asked. Thus, with the aid of a suitable program (the technical details of which cannot be gone into here) the machine by itself was enabled to carry out a search for the recorded texts whose contents wholly or partially matched the questions.

During the first phase of the experiment (1961-62) the machine employed was an IBM 7090 computer. A corpus of 3,000 texts was assembled of which 1,500 were supplied by CARDAN as the result of abstracting nearly 200 periodicals. Eighteen questions, formulated in accordance with the code, were chosen as corresponding to the aims of the experiment.

A check list of the expected answers to each question had been prepared manually beforehand, making it possible to verify the aptness of the answers furnished by the machine.

The second phase was carried out in 1964-1965 using an IBM 1401 computer. It covered 2,500 documents on African ethnology and confirmed the results obtained in the first phase.

It can be stated, therefore, that it is possible by purely automatic means to retrieve documentary material answering various requirements in the human sciences. In this field,as in that of the exact sciences, a computer can produce lists of titles, periodicals or abstracts as well as specialised bibliographies either recurrent or unique (6).

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(6) The results of this experiment, which is to be continued in 1970, have been given in various reports, in particular:

- Report on an experiment in automatic documentation and proposals for its development. - Paris, Maison des Sciences de L'homme/CADAN/SESD, 1962, 19 p., mim.
- Izard F. - Une expérience de traitement automatique de la documentation à partir de documents concernant l'Afrique au Sud du Sahara. - Paris, CADAN, 1962, 15 + 6 p., mim.
- Economie générale d'une chaîne documentaire mécanisée. Draft final report for the research convention No. 63 FR 270 ... - Paris, CADAN/DGRST, March 1966, 239 + 16 + 18 p., mim.

5. SOCIOLOGY

The experiment described here relates to a technical application of sociology, not to that discipline as a science. It covers the practical implications of various social sciences and is being carried out at the Documentation Centre of the National Superannuation Fund for Building and Civil Engineering Workers, known as the CNRO (*Caisse nationale de retraite des ouvriers du bâtiment et des travaux publics*) and located at 36 Rue de Vouillé, Paris 15^{e}.

The CNRO has nearly 400,000 members and processes some 35,000 files every year. For this purpose the Centre holds a very large collection of documents relating to the problems of old age. The collection embraces:

Administrative documents (official, legislative, etc., texts governing the pension and superannuation scheme)

Fiscal and juridical documents

"Gerontological" documents in the strict sense of the term, with a marked medical slant (problems in geriatry, re-education and rehabilitation among others).

The Centre is also developing documentation on childhood problems. For its automatic documentation it has an IBM 360/50 computer with 27/40 terminals, which is used for experiments outside the administrative accounting work for which it was primarily acquired. The machine uses a SAGESSE program, which has had to be modified for the purpose of handling this particular kind of documentation.

The experiments have entered upon an active phase, but it will be some months before the results are analysed and made known. This initial stage must be completed before it can be judged whether the preliminary work, and particularly the documentary language developed for the processing of these documents, answer their purpose, which is the constitution of personal files.

6. LAW

In the juridical sciences also, information and documentation have reached the stage of automatic processing by computer. It should be noted that the computer has not been introduced at the level of law research but at that of practical activities in the legal and judicial professions.

It may be of interest to recall the modernising efforts made during the last few years by the Ministry of Justice. Certain departments of that Ministry are already using the computer for building up their card-indexes: staff management, keeping-up records of petty offences (four million a year in Paris), central judicial records, criminological research, etc.

6.1 *Semi-automatic documentation at the CRIDON Centres*

Centres for Regional Information and Notarial Documentation ("CRIDON") exist in several French cities. They have been in operation for six years and are used for up to 6,000 consultations a year. Their subscribers and users are notaries who desire information for purposes of consultation or for drawing up contracts or deeds. Since they were started, they have collected an impressive amount of juridical material on which mechanisation has been tried; this is deserving of mention here as it is likely to lead to the automatic processing of such documents.

It is at the CRIDON in Paris (12 Avenue Victoria, Paris 2^{e}) that this semi-automatic system for the storage and selection of legal documents appropriate to the needs of notaries can be seen in operation. An abstract is made of each basic document and is indexed by keywords. These data, complementing the actual bibliographical reference, are recorded in plain language and simultaneously as a pattern of holes punched in one or more punch-cards of the normal type. Approximately 170,000 such cards have been punched for the 20,000 documents accumulated at the CRIDON in Paris up to the present.

The equipment used for selective retrieval is an ICL sorter, but this is soon to be replaced by another and more powerful sorter (able to sort six columns simultaneously).

This Centre serves, therefore, primarily as a card file of personalised bibliographical information. It is, of course, available for supplying users with the original or reproduction of any document requested, either in whole or in part, but its main purpose is to search, in accordance with a keyword thesaurus, for those documents in which the user is likely to find the information he wants.

The service is operating with satisfactory efficiency and speed in relation to the needs of its clients.

The question of changing over from the present semi-automatic to a fully-automatic system using a computer will no doubt arise in the coming years. For the constantly accelerating rate at which legislation and case-law are evolving and changing renders the task of notaries more and more complicated. Moreover, the working methods now in use at the CRIDON provide an excellent approach for the adoption of new techniques. This is among the subjects to be considered at the impending 66th Congress of French Notaries.

6.2 *Automatic documentation on case-law at the University of Montpellier*

The experimental programme being carried out at the University of Montpellier is at present the most advanced of those relating to the automatic processing of juridical documents.

Its purpose is to arrive at a way of using a computer for retrieval of the decisions handed down by the Court of Cassation. The tests involved are therefore limited in number but important and varied.

This material is already accessible in the form of monthly bulletins, produced manually. These bulletins are the basic documents for constituting the collection of cards which is searched automatically, holes being punched in the cards to correspond with various data such as summaries of the judicial decisions, their dates, their locations (i.e. the Division of the Court that gave the judgement) and any other necessary information. On the average, there are four cards for each decision.

The summaries are expressed in a standardised language with lexicon and syntax. Each summary contains information in alpha form, and this is stored along with "address" elements (year, Division of Court, number of judgement, paragraph number, number of sentence within the paragraph). Various sorting programs are then operated in order to retrieve the pertinent information, i.e. the decision or decisions of the Court of Cassation relevant to the specific question asked.

The electronic equipment in use belongs to the computer laboratory in the Faculty of Science at Montpellier, comprising a 64K IBM 360/40 computer with three 2311 disc units, a printer and a card reader-punch.

The first results obtained are encouraging. At present the experiment is being concentrated on determining the "noise" level associated with the processing of the questions, which in general is negligible but of course depends on how the questions are formulated. As regards the "silence" rate, experiments are still proceeding and no other information is available on this subject.

The experiment is intended to continue for five years and will not be finished before 1972. Not until then will it be known for the sake of comparison whether the processing of questions by computer offers advantages in speed and quality over the manual process which will be carried on. It can, however, already be said that this experiment raises great hopes, for it has enabled existing weaknesses in the drafting and summarising of court decisions to be detected and remedied; likewise the formulation of questions has been improved and new rules for the automatic processing of documents are being evolved.

7. EDUCATION

Education has already been mentioned among the human sciences to which the Documentation Centre of the CNRS devotes part of its activities. Educational documentation there relates essentially to the scientific aspect of that discipline, to theoretical and practical problems of research.

There are of course many other documentation centres in the fields of pedagogy, educational sciences and teaching practice. Confining ourselves to those bodies under the aegis of the Ministry of Education, concerned with what may be called "public instruction", two should be mentioned which to a differing degree contemplate or already apply new techniques for processing all or some of their documents.

7.1 *Towards an automatic documentation project at the INFA Documentation Centre*

The National Institute for Adult Education (*Institut National pour la Formation des Adultes*, Rue de Saurupt, Nancy), known for short as INFA, maintains a documentation centre whose sphere of activity seems destined in all probability to undergo great development in the coming years.

It is common knowledge that education in the wide sense of the term is no longer today, and will be still less in the world of tomorrow, concerned only with persons of school age. We are aware of the problems of teaching and training, resettlement and re-adaptation - in a word, those of permanent education - which arise ever more pressingly at all stages of life.

The INFA is the institution responsible for co-ordinating all activities that relate to permanent education in France. It is not concerned only with pedagogy as applied to the teaching of various academic disciplines or to the acquisition of new occupational skills, but with pedagogy directly related to economic and social realities in a highly industrialised country.

Thus the documentation of the INFA is concerned with all branches and levels of knowledge and skills. It is also designed for a considerable and varied body of potential users whose future orientations or reorientations cannot be certainly predicted.

Seen in this light, it is reasonable to expect that the traditional techniques of documentation will soon be inadequate. Consequently the INFA Documentation Centre intends to go over to new techniques in the fairly near future. The project is still only at its starting point and is limited at present to theoretical investigations for reconnoitring the problem.

The INFA Documentation Centre and its subsidiary Documentation Centre for Programmed Instruction or CDEP (*Centre de Documentation sur l'Enseignement Programmé*, 9 Rue d'Ulm, Paris 5^{e}) were attracted at first to examining a documentary system said to have given good results in the United States of America. That system, ERIC, has certain features which at first sight suggested themselves as models for a national centre for documentation on adult education.

An edition of the ERIC thesaurus has already been translated by the CDEP. This translation, which is now being checked, should enable useful comparisons to be drawn between what is being done in the United States and what might be done in France to provide a suitable language for the automatic processing of documentation relating to education in the widest sense of the term.

At present that is how the matter stands. It is not yet possible to foresee what the final decision may be, still less by what methods it would be given effect.

7.2 *Two experiments proceeding at the Institut Pédagogique National*

The IPN (29 Rue d'Ulm, Paris 5^{e}) is a public institution under the Ministry of Education with essentially three commitments:

- educational research,
- teaching aids,
- documentation and information on teaching and education.

Though the central service is located in Paris its activities extend into each of the twenty-three educational districts into which France is divided, through the regional centres for educational documentation (CRDP), which in turn have branches in the Départements known as *Centres départementaux de documentation pédagogique* (CDDP).

The documents handled by the various services affiliated to the IPN (headquarters and local sections) relate to all aspects of education, instruction and teaching both in France and abroad. The great majority of users are engaged in some activity or profession connected with educational theory or practice. This documentation, both *for* and *on* education, instruction and teaching is divided between three broad sectors:

"Administrative" documentation relating to the official circulars, laws and regulations governing public education in France (7).

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(7) This also includes "official" material relating to educational systems in foreign countries.

"Pedagogical" documentation for the benefit of all kinds of research workers but chiefly those concerned with the pedagogical problems that arise in pre-school, primary and secondary education.

"School" documentation, which is concerned especially with teaching practice at these three levels, and above all with teaching aids, i.e. with all pedagogical and didactic media and equipment available in support of the teaching function.

The two experiments in automatic documentation on educational material now to be described fall under this last-mentioned sector.

7.21 *Automatic processing of documentation files at the CRDP, Toulouse*

The starting point for this trial of automatic documentation is the assessment of the utility of what the IPN calls "teaching kits" (*valises pédagogiques*).

What is a "teaching kit"? This name is given to a collection of all sorts of documents, or teaching aids, relating to a single theme or centre of interest - for instance aviation, the Canal du Midi, bread. The "kits" are intended mainly for use in primary schools, where the same teacher covers all subjects. The kits, therefore, are made up of documents that can be utilised for class lessons in French, mathematics, history, geography, etc. as the case may be. They can also be used by teachers who specialise in these subjects. The collections are made up once and for all but can be brought up to date, and they are passed from class to class or from school to school as required. From the educational standpoint the results are excellent, but they call for a considerable financial effort because of the volume of reproduction needed to meet the demand (there being up to eighty papers in each kit).

Why not, it was thought, replace this primary documentation by a secondary form of documentation,composed not of the documents themselves but of selective bibliographies showing the titles and locations of the various teaching materials appertaining to each subject or centre of interest? Going further,the systematic and repetitive nature of these bibliographies naturally suggested the idea of producing them by means of automatic processing by computer.

The scheme consists, therefore, in *abstracting documents with a view to the automatic compilation of documentation files for the use of teachers* of various subjects in schools, while of course keeping the basic documents at the users' disposal in the documentary sections of the CRDP, as hitherto.

The experiment has been going on since 1964, but a permanent staff of five has been assigned to this task only since 1 October 1968. The research programme is already well advanced and the scheme will be put into service systematically around June 1969.

The equipment in use is a GAMMA 10 computer supplied by the Bull-General Electric Company. The system is based on a thesaurus, meaning a collection of keywords which occupy fixed positions in a diagram, interrelated both vertically (hierarchically) and horizontally (syntactically). The hierarchical arrangement extends only to the main keywords and to the words immediately following these.

Choice of keywords is necessarily restricted, the criteria of choice being based on a definition of the subject matter or discipline from which the keywords are extracted. As this definition is made as practical and objective as possible, it may differ from traditional definitions.

Examples:

philosophy : global conception of man and the universe

teaching : transmission of conceptions

art : manifestation of conceptions

literature = written text

artistic education = affecting the eye or ear

chemistry : reaction

physics : force, motion

etc.

Within each of these subject fields, the corresponding terms are arranged in homogeneous lists which are mutually exclusive, the object being to ensure that different analysts will use the same keywords to characterise any given document. Each keyword must be usable in only one sense, that sense being determined by the subject term or main keyword by which it is introduced. Hence there can be no synonyms within any given subject.

This division of the keywords into mutually exclusive lists makes it possible to eliminate intermediate terms. For instance ECONOMICS may be followed by AUTOMOBILE without having to introduce intermediate hierarchical terms such as INDUSTRY and INDUSTRY/ENGINEERING.

Consequently the terms that cover general ideas are used no more frequently than the more specific terms - whereas in hierarchical classifications the more general a term the more often it occurs.

In the present case, if documents on INDUSTRY/AUTOMOBILE were wanted these would be searched for first under INDUSTRY/ENGINEERING and then under AUTOMOBILE; but if documents on INDUSTRY/ENGINEERING were wanted only the cards indexed under that heading would be examined, disregarding the INDUSTRY/AUTOMOBILE, INDUSTRY/NAVAL or INDUSTRY/AERONAUTICAL cards.

More practically, in making abstracts, nouns are preferred to adjectives and the singular to the plural.

Initially the amount of human, as opposed to mechanical, classification work involved in abstracting was under-estimated. This work of classification is the key to the efficiency of the system and is unavoidable, despite the technical possibilities offered by the computer. In the present case a thesaurus would have had to be compiled before it became possible to abstract, and everything would have had to be abstracted in order to compile the thesaurus.

Budgeting for this experiment in automatic documentation has not given rise to any special demands. The documentation staff employed for scanning and abstracting are complemented by the Reproduction Service of the CRDP at Toulouse, which is doing this work in addition to its normal administrative work. The main additional cost incurred is for purchasing the punch-cards needed in the experiment.

7.22 *Automatic cataloguing of teaching aids by the Document Processing Group of the IPN*

The Document Processing Group (*Groupe d'Informatique Documentaire*, GID) of the IPN can be described as a sort of research laboratory dealing with data processing and communication in the field of educational documentation. A considerable part of the Group's activity has been devoted to surveying the needs of those who use the educational documentation services by way of a questionnaire (8).

This enquiry among more than six thousand users of five educational documentation services under the *Institut Pédagogique National* has entered upon its final phase. Its results are analysed in a report now almost completed.

Even before the survey was undertaken the GID was studying an experimental project for automatic documentation, of which a brief account has been issued (9).

The main features will be summarised here. The object is automation of the input and storage processes in order to obtain, by automatic selection and print-out, bibliographical references to teaching aids approved and chosen by ministerial committees which, through the IPN Department of Teaching Aids, examine the educational material submitted to them.

This educational material is extremely varied. It includes all "documents" other than school textbooks that may be needed by teachers in class, including "iconographical", sound and audio-visual documents, as well as instructional and scientific equipment.

The purpose of the experiments now proceeding is to make possible the supply, on request, of either exhaustive or select lists, systematic catalogues or indexes made up of bibliographical references pertinent to all these teaching ancillaries, classified according to type of document, subject and level of use all compiled and kept up to date by automatic means.

The electronic apparatus contemplated for this experiment in automatic cataloguing is the GAMMA 10 card sorter with 4,096 storage positions, supplied by the Bull-General Electric Company. This machine, intended primarily for administrative processing and scientific computing in educational research, is expected to be delivered at the IPN next June, and preparations for installing it are already in hand.

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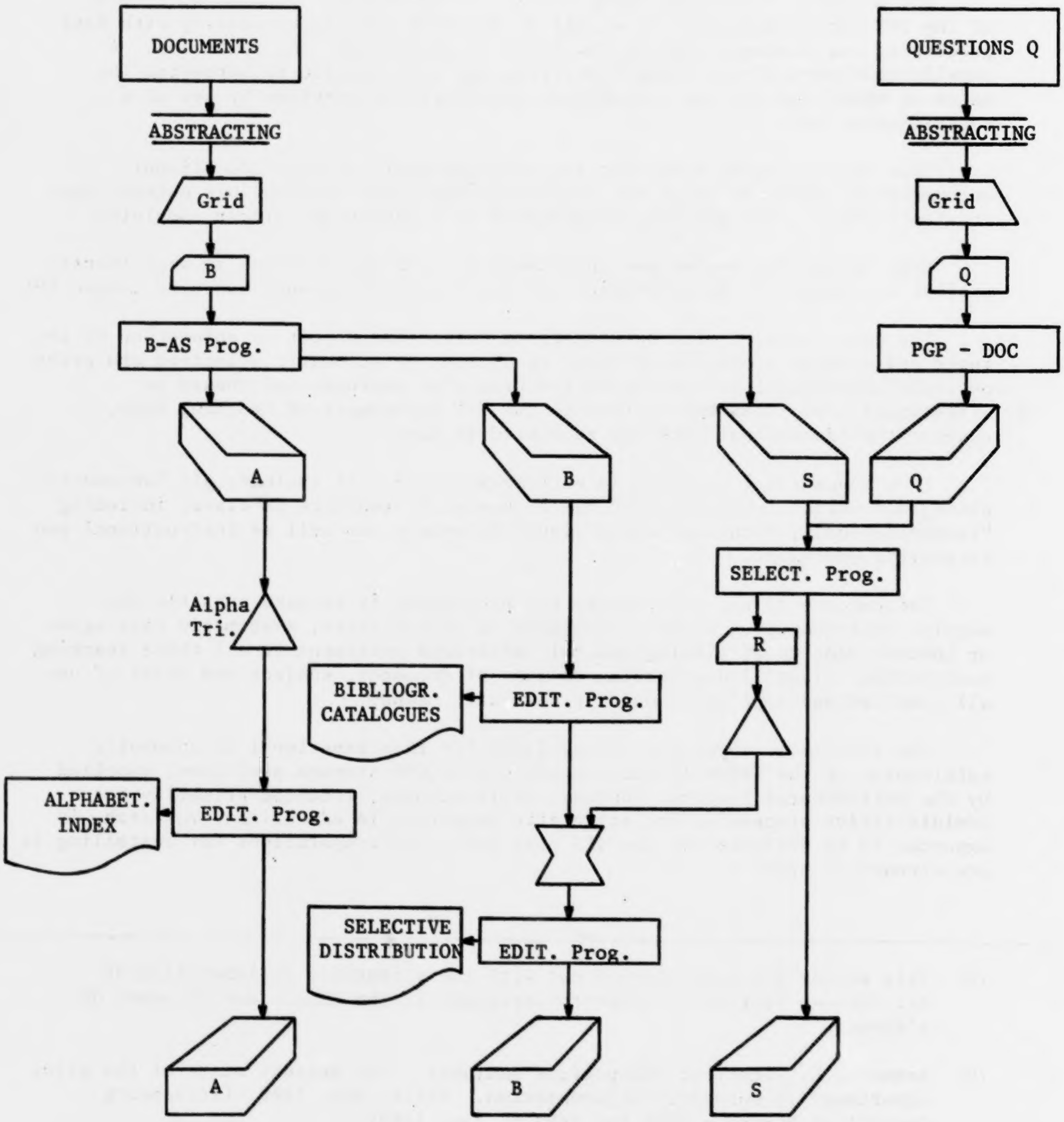
(8) This survey has been carried out with the scientific collaboration of Mr. Jacques Perriault, research assistant at the *Maison des Sciences de l'Homme*.

(9) Bonnefoi C. Institut pédagogique national. The present stage of the pilot experiment in automatic documentation. Paris, Nov. 1968. (Strasbourg, Council of Europe - DECS Doc (69) 1, Jan. 1969).

Flow Chart 1 - **Compilation of Sets of Cards and Selective Distribution**


DOCUMENTS
QUESTIONS Q
ABSTRACTING
ABSTRACTING
Grid
Grid
B
Q
B-AS Prog.
PGP - DOC
A
B
S
Q
SELECT. Prog.
Alpha
Tri.
R
BIBLIOGR.
CATALOGUES
EDIT. Prog.
ALPHABET.
INDEX
EDIT. Prog.
SELECTIVE
DISTRIBUTION
EDIT. Prog.
A
B
S

As regards the actual procedures for automatic documentation the work of first priority has already been completed, this being the collection of documentary material, the designing of the storage "entry frames" ("analytical grids"), the compilation of a provisional thesaurus, the development of classification and coding systems, and punch-card design. The work of abstracting the primary documents (onto catalogue cards compiled by the Department of Teaching Aids) and of transcribing the data onto the grids is now proceeding.

The forecasts are as follows: by the end of 1969 it should be possible for the three documentalists of the GID to complete a first batch of 2,000 analytical grids. At the same time the corresponding punch-cards will have been punched and checked. The computer programs can then be written out in detail by the programming team of the IPN Reproduction Service.

There will then be a sufficiently developed embryo for the automatic system, which should enable most valuable observations to be made on all of the operational routines and their constituents, including the "automatic card-collections". It may here be of some interest to give a few details of these sets of cards, the general principles for establishing and using them being shown in the accompanying flow charts. These are six sets:

(a) The first is known as "Bibliography collection B"; this is of use throughout the bibliographical editorial work as the information stored in it is in "plain language". It is the foundation of the system as it has to serve for the automatic constitution of the search sets.

(b) "Analysis collection A" is a search set. Its contents must be limited to such data as are of direct interest for searching (mainly the descriptor keywords and authors' names). It is a kind of permanent inventory of the occurrences of the keywords (or authors) in the documentary field.

(c) "Synthesis collection S" is designed for complex or multiple searches. It can be used only by following a sequential method of enquiry conducted by multiple and simultaneous interrogations. (Sets A and S are constituted automatically from set B, by means of a program denoted B-AS: see flow chart 1.)

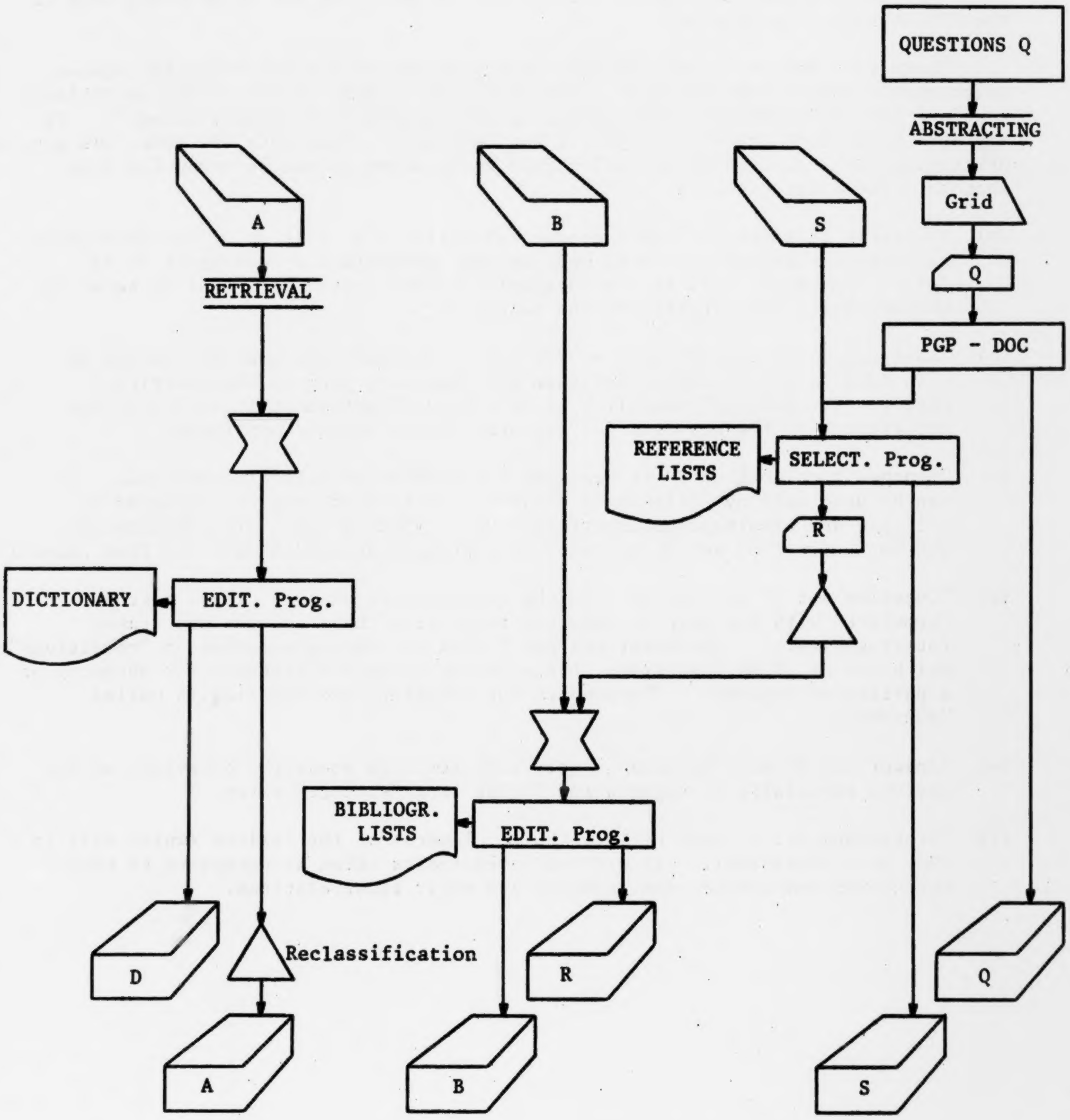
(d) "Question set Q" is made up from the questions received. These must be formulated with the help of keywords taken from the thesaurus and framed interrogatively. The questions are formed by stating a number of "conditions" which may be of various types, the main one being the presence (or absence) of a particular keyword. The program for compiling and handling is called "PGP-DOC".

(e) "Answer set R" will be used jointly with set Q to study the behaviour of the system, especially as regards the "noise" and "silence" rates.

(f) "Dictionary set D" must reflect the development of the lexicon (which will in fact be a thesaurus). It will be re-edited as often as necessary to keep watch over and control the keywords and their interrelations.

AUTOMATED CATALOGUING AT THE IPN (GID)

Flow Chart 2 - **Retrospective Search**


QUESTIONS Q
ABSTRACTING
Grid
Q
PGP - DOC
A
RETRIEVAL
B
S
REFERENCE LISTS
SELECT. Prog.
R
DICTIONARY
EDIT. Prog.
BIBLIOGR. LISTS
EDIT. Prog.
D
Reclassification
R
Q
A
B
S

8. CONCLUSION

Is it possible to draw conclusions from this review of French documentation centres specialising in the human sciences and applying or trying to apply new techniques, and to forecast the outcome?

The author of this national report would prefer, for his part, to confine himself to the following affirmations, speaking for himself and as a professional in documentary techniques:

(a) Documentation centres exist in France which are interested to a varying extent in the application of new documentary techniques to the human sciences. Most of them belong to the public sector.

(b) In some of them (CMRS, INFA) projects are under examination, while in others projects have already been put into effect (CARDAN) or are being introduced (CNRO, University of Montpellier, CRDP at Toulouse, IPN-GID).

(c) The projects under way are not yet operational but only experimental in character.

(d) These projects relate not to one field but to several of the human sciences, which goes to show that despite the difficulties inherent in documentary work on the human sciences such activity is not immune to technical progress or at least to its temptation.

(e) The current projects relate to documentation on human studies not as fundamental sciences but primarily as sciences applied to specific practical activities (pension and superannuation files as applications of sociology at the CNRO, case-law documentation for lawyers at the University of Montpellier, documentation on teaching practice as a branch of pedagogy at the Institut Pédagogique National - CRDP Toulouse and GID).

(f) All these projects have a specific character, and even where several of them co-exist in the same discipline (such as law or education) there is no organic link between them; they are independent of one another because they have different targets (in this case the users concerned), which act as "modifiers".

(g) The projects do not fit into any overall national plan, still less into an international one.

These general observations apply to educational documentation in particular, on which subject the following additional remarks may be made:

The experiments in rendering educational documentation automatic which are being carried out at the CRDP in Toulouse, and those of the IPN-GID, relate to only one narrow sector of educational documentation in general, namely teaching aids.

At the CRDP in Toulouse it is scholastic equipment which the various documentary sections at that Centre collect and keep available to users, who are teachers in the primary and secondary schools under the *Académie* (educational district) of Toulouse. Consequently this particular experiment in automatic documentation has a regional character.

At the IPN-GID the scope of the experiment is more general in so far as it concerns, at the national level, teaching aids and didactic and scientific equipment for primary and secondary schools, these aids and equipment having been chosen and approved by ministerial committees. The addition of other educational documents (including school textbooks and articles in periodicals) which fall outside the scope of those committees is contemplated. At the same time two other developments are planned, one of them relating to a new teaching discipline known as *initiation technologique*, and the other to a sector of the French school system which deals with handicapped children.

However, these two experiments bear upon only one particular part of educational documentation, that of teaching practice, while disregarding the other areas such as:

- administrative documentation (official circulars, laws and regulations relating to the educational system in France and abroad),
- "scientific" documentation on theoretical and practical research in education.

Thus they leave out of account two important categories of users:

- public authorities, official bodies and all who (in France as elsewhere) need administrative documentation,
- research workers desirous of being kept in touch with developments in educational research.

There are, therefore, gaps in these experiments which narrow the circle of consumers on the national plain and still more so internationally.

Yet these modest experiments, these first approaches to the application of new techniques in educational documentation, are not without certain merits:

They introduce into educational documentation certain innovations which have proved their effectiveness in other fields for the processing and production of useful documentary material.

They create new working conditions for the technicians of documentation who, it may be hoped, are thus enabled to appreciate the extent to which certain routine operations in the documentary chain can be lightened by automation. This psychological consideration should not be underestimated either in this particular field or more generally. It may readily be felt that it is not only in educational documentation services, and not only in France, that documentalists need to be disabused of the myth of the computer.

Although these experiments are primarily addressed to a single national, or even regional, class of users - namely teachers in primary and secondary schools - yet some aspects of them may prove of interest to other educationists even beyond the national frontiers.

It may be granted that a textbook of mathematics used in French schools is not likely to be of much value to a mathematics master at, for instance, an *Oberrealschule* in Bavaria; but will a foreign investigator who is making a study of new pedagogical methods finding application in France for teaching the new mathematics or for operating a language laboratory be content to know nothing of the material foundation for those methods? Can the audio-visual aids (slides, films, sound recordings on discs or tapes) used in French schools fail to interest teachers of the French language and civilisation in foreign countries? And would not the converse in each of these cases equally apply?

Finally, these two experiments provide the initial basis for a standardised linguistic system adapted to the automation of documentation in the field of education.

Whether the ultimate outcome is a classification of the traditional type or more likely an open thesaurus, a tentative organisation founded upon concrete realities will have been given a trial, and this is a precondition for staking out the conceptual field in an essential sector of educational documentation. A scaffolding will have been erected, one that is sufficiently flexible and adaptable, it may be hoped, for the incorporation of the adjustments and additions which are already seen to be urgent and necessary.

Doubtless much remains to be done and massive resources will have to be brought into play before a national structure can be completed. Doubtless, also, we must look ahead to the day when it will need to be fitted into an international whole.

With these two vistas before us, let us hope that all those who are working on the automation of these techniques, and on these new procedures for educational information and documentation, will henceforth combine their efforts to a common end.

DOCUMENTATION FOR EDUCATION AND THE SOCIAL SCIENCES IN THE FEDERAL REPUBLIC OF GERMANY

by *M Cremer*

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1. INTRODUCTION

1.1 There can be no doubt that the modern technological mass-society, which means in general the society of the '70s, will be confronted with the need to find solutions to new and important problems. The constant increase in population and Gross National Product, the accelerated rate of continuous technological innovation, and the fact that the developing countries are becoming members of this modern society, are essential aspects of these problems, which are both political and economic. They also involve social processes, problems of environment, of adaptation to new structures of society and of new techniques of communication.

Some general remarks should be made on the scientific and technical information needs of modern society. We are clearly at the beginning of a new phase of quantitative and qualitative development. This phase needs new organisational, methodological and technical consideration at both national and international levels. The main elements which determine information needs are:

- The sum of human knowledge, as incorporated in documents and data, is increasing rapidly (by nearly 10% per year), and needs new organisational and technical systems to cope with it.
- A similar rate of expansion is to be found among the users of information, which means in general scientific workers and all others who need information.
- The extensive specialisation in all sciences and the corresponding interdependence of special fields of interest is increasing. The diversified need for information requires new documentation systems.
- The field of documentation has expanded much more rapidly than had ever been expected. In addition to the documentation of natural science, including medicine, agriculture and food sciences and of technology, the information problems of the social sciences, including jurisprudence, empirical social research and political science, must be solved as a step in laying the basis for informed political, economic and social decisions.
- The structure of information has itself changed. Besides books and periodicals (which are as important as ever) new types of scientific information media must be considered. These include not only congress papers, patent specifications, and technical and scientific reports, but increasingly information given in the form of 'data', which must be collected and stored. The data are not only technical and scientific numerical data, but also data of medical record documentation, which have to be evaluated for diagnosis, therapeutics and decisions in public health administration.

1.2 Data documentation plays an important part in the social sciences and especially in education. It is easy to predict that educational research and broad sectors of educational planning (school planning, university planning and reform, restructuring of adult education and vocational training, curriculum research) will come to depend on social science or educational science data banks. Some projects mentioned in this report are relevant here.

In this connection it should be mentioned that the recording and evaluation of research projects, especially those in progress in the social science field, is a most important and necessary information function. It is evident that the interchange of knowledge of such projects is still inadequate, which results in duplication of work, delays and poor results. This is true also for the education science itself. It seems that the interest in special information systems is increasing. An example of such a project will be given later.

It must be noted that documentation work in social science meets with both quantitative and qualitative difficulties. The number of documents and data to be recorded is extremely high, and the information processed is often of less value than that in the natural and engineering sciences. This results in difficult problems of selection and of evaluation. Furthermore, in social science documentation a great amount of 'soft data' have to be processed, and problems of terminology and difficulties in definition arise. This requires extensive preliminary work in setting up the structure of mechanised storage systems, search strategies, thesauri, and so on, if the information output is to be satisfactory.

1.3 The new techniques, in particular the application of electronic data processing and of new repro- and micro-techniques, will make it possible to satisfy the demand for quick and complete information. It must be pointed out, however, that the setting up and maintenance of modern information systems needs extensive preliminary intellectual effort and a high level of investment in research, development and operation.

The relevant techniques can not be described in detail here. Electronic data processing methods can be used - and are being used today with priority in the Federal Republic of Germany at least - for the automatic arrangement of data (titles, descriptors, abstracts), for the arrangement of listings, for automatic cumulation, and also for controlling automatic printing processes. This means that the extensive and tiresome manual work of composition and correction for conventional printing techniques can be avoided. We know from experience that good 'packaging' of information is of great value in its utilisation. Furthermore the computer is making it increasingly practicable to set up machine-readable stores, accessed either directly or indirectly. Although this still involves certain difficulties and delays, it will become much easier and more effective in the near future. Present experience seems to show that a combination of mechanically processed published documentation services (titles with descriptors and/or abstracts, multi-dimensional listings and cumulation yearly and/or over several years) as current awareness services, and the computer storage of the same material for retrieval purposes, represents the optimal mix for the supply of information. The use of automatic text handling, automatic text analysis and automatic indexing, will result in further important improvements. The development of mechanised translation systems will help to overcome the linguistic problems in information systems. In the field of reprography and micro-techniques we are at the beginning of a development which will lead to reproducible micro-forms for scientific and other documents instead of conventional publication. This will be of decisive influence to the further development of both librarianship and scientific documentation.

1.4 The 'explosion of information' or 'information pollution' calls for an 'information policy'. In this connection two tendencies may be observed: the tendency to achieve a higher degree of concentration within interdisciplinary institutions, and the tendency to more efficient internationalisation. Greater interdisciplinary concentration is necessary to avoid duplication of work, and will involve careful and planned co-operation, so that the information systems of all disciplines become exchangeable. The user must have easy access to more than one system. In this way a coherent network of information services can be built up. The need for international co-operation does not need to be underlined. From the organisational point of view there are two types of international system: national systems of general and international importance (e.g. most of the big abstract journals), and international, i.e. bilateral, multilateral, regional or world-wide systems. The latter will be of particular importance in the field of educational documentation.

2. LIBRARY AND DOCUMENTATION SERVICES FOR EDUCATION

2.1 In general, each scientific library, that is state and university libraries as well as the scientific branches of public libraries, collects literature on education more or less extensively. This literature is accessible to all. If it is not locally available it will be obtained through the inter-library loan system. Of great importance in this connection are the University Library at Erlangen, which covers the education field as a 'collecting centre', by virtue of which it is subsidised by the German Research Association, and the *Deutsche Bibliothek* in Frankfurt. This institution acts as the German archive library and also collects and records all German language literature covering education.

Of particular interest in this field are the big specialist libraries, primarily the library of the *Deutsches Institut für Internationale Pädagogische Forschung* in Frankfurt, the library of the *Pädagogisches Zentrum* in Berlin, and the library of the *Max-Planck-Institut für Bildungsforschung* in Berlin. These libraries have extensive collections of German and foreign literature, of non-conventional literature and catalogues. Other special libraries having important collections are the *Pädagogische Zentralbücherei des Landes Nordrhein-Westfalen*, Dortmund, the *Allgemeine Lehrerbücherei für das Land Niedersachsen*, Hanover, the *Pädagogische Zentralbibliothek Rheinland-Pfalz*, Koblenz, and the *Bibliothek der Landesanstalt für Erziehung und Unterricht*, Stuttgart.

The libraries of the Colleges of Education, which are in some cases voluminous, and the Teachers' libraries which however are mostly only of local interest, should also be mentioned. Furthermore, the library and archives of the Secretariat of the *Ständige Konferenz der Kultusminister* at Bonn and of the *Westdeutsche Rektorenkonferenz* at Bad Godesberg have important material concerning education policy and educational research. Certain co-ordination and advisory functions are carried out by the *Arbeitsgemeinschaft pädagogischer Bibliotheken* at Dortmund.

2.2 In the field of educational documentation the following larger projects deserve mention:

2.21 The *Bibliographie Pädagogik*, a monthly publication published by the Dokumentationsring Pädagogik. The Dokumentationsring Pädagogik is a chain of institutions co-operating in the field of educational documentation. As well as one institution in Austria, it comprises in the Federal Republic of Germany:

- Deutsches Institut für Internationale Pädagogische Forschung, Frankfurt/Main
- Deutsches Jugendinstitut, Munich
- Dokumentations- und Auskunftsdienst der Ständigen Konferenz der Kultusminister, Bonn
- Institut für Bildungsforschung in der Max-Planck-Gesellschaft, Berlin
- Internationales Zentralinstitut für das Jugend- und Bildungsfernsehen, Bayerischer Rundfunk, Munich
- Pädagogisches Zentrum, Berlin (editing and co-ordination centre)
- Dokumentationsstelle Moderner Fremdsprachen-Unterricht beim Arbeitskreis Lehren und Lernen, Heidelberg
- UNESCO-Institut für Pädagogik, Hamburg.

These institutions are active in the preparation and publication of the *Bibliographie Pädagogik*.

The *Bibliographie Pädagogik*, which first appeared in April 1966, primarily lists publications available through the book trade.

Only publications, articles in periodicals and monographs, which are relevant to the field of education are listed in the *Bibliographie Pädagogik*. The content of every publication is indicated by descriptors. The list of descriptors is an amalgamation of four separate lists (second revised edition, January 1966). It is possible to use unlisted descriptors provisionally pending a final decision.

The machine-readable titles with descriptors are sent by the other institutions to the Pädagogisches Zentrum where the *Bibliographie Pädagogik* is compiled. The bibliography lists about 430 important periodicals and has an alphabetical index, three subject indexes and an index of persons and institutions.

Machine-readable titles on punched paper tape have been used since 1968. Further developments in the application of computer techniques are under consideration.

2.22 Documentation of modern training media - The *Arbeitskreis zur Förderung und Pflege wissenschaftlicher Methoden des Lehrens und Lernens*, Heidelberg, promotes and co-ordinates three institutes which have built up a modern educational media documentation system:

- Internationales Zentralinstitut für das Jugend- und Bildungsfernsehen, Munich

- Informationszentrum für Fremdsprachenforschung, Marburg

- Dokumentation Programmierter Unterricht im Pädagogischen Zentrum, Berlin.

The institute at Munich records the international literature and technical data on television programmes for children and adolescents, including educational programmes. Special bibliographies are published at irregular intervals.

The modern languages research centre at Marburg records literature and other sources (language laboratory tapes) concerning modern methods of teaching foreign languages. Indexing is based on a thesaurus of nearly 550 descriptors.

All material is recorded in machine-readable form. Special bibliographies are published. Close co-operation is maintained with the American ERIC system for the exchange of documentary material.

The documentation section for programmed instruction is part of the Pädagogisches Zentrum, Berlin. It publishes the two-monthly bibliography *Programmierter Unterricht*, the first volume of which appeared in 1965. The bibliography lists literature (monographs and articles in periodicals) on programmed instruction. 75% of all the literature listed is in the English language. Each article is indexed by descriptors. The titles follow a systematic order. There are also author and descriptor indexes. The first edition of the Thesaurus for programmed instruction was published in 1966.

Since Volume 4 (1968) machine-readable titles on punched paper tape have been used to facilitate future computer storage. To enable the computer to print out lists etc. the programmed instruction thesaurus will be revised on the basis of the *Information Retrieval Thesaurus of Education Terms*.

2.23 Documentation of science teaching - The *Institut für die Pädagogik der Naturwissenschaften*, Kiel, records all publications concerned with the didactics of physics, chemistry and biology. About 110 periodicals are regularly read and nearly 400 articles per month are recorded. The indexing is done by using descriptors in hierarchical order, with additional notations similar to UDC. The introduction of EDP is planned, and contacts have been established for an information exchange with Great Britain and USA.

2.24 The surveys on educational research projects are not reported here in detail. Several institutes have carried out such surveys for which the following two may serve as examples. The Pädagogisches Zentrum in Berlin published in 1967 a report on research projects in progress *Dokumentation Forschungsarbeiten Pädagogik*, Verlag J. Beltz, Weinheim,and in 1968 the Co-ordination Bureau for Documentation of Social Science Research, Cologne, carried out a survey on social science projects, including educational research projects, the results of which were published in a title list *Titelliste über Projekte sozialwissenschaftlicher Forschung*, Cologne, 1969 (see also 3.3).

3. FULLY OR PARTLY MECHANISED SYSTEMS IN SOCIAL SCIENCE

The following systems are described briefly in view of their possible interest to educational documentation and information.

3.1 *International Management Information System* (Dokumentationsring Betriebswirtschaft)

This system is based on co-operation between fifteen German institutes (mostly University Institutes and special research centres) and eight institutes in France, Italy, Netherlands, Spain, UK and the USSR). The Committee for Economic Rationalisation (Rationalisierungs-Kuratorium der Deutschen Wirtschaft, RKW), Frankfurt, serves as the collection and distribution centre. The institutes produce index cards bearing the usual bibliographic data including descriptors and abstracts. At present about 1,000 titles a month are indexed of which 400 are in German, the remainder in other languages. Each member of the network is responsible for the complete scanning of a certain number of periodicals. In this way at present about 700 selected periodicals are regularly covered.

The *International Management Information System* has developed its own classification system. RKW does the indexing and prints the index cards as well as distributing them to the various members. It also supplies, if required, indexed articles by means of a clearing system.

All data is punched on 8-track paper tape. Data is assembled in a way that allows a variety of computer operations. For this purpose RKW has developed a schema of categories in close co-operation with the Zentralstelle für maschinelle Dokumentation (ZMD), Frankfurt. At present the following operations are performed by computer:

- Transfer of data from 8-track paper tape to 9-track magnetic tape, with all necessary corrections.

- Storage on magnetic tape for electronic retrieval.

- Preparation of a 9-track magnetic tape for printing a bibliographic periodical: *Bibliographie betriebswirtschaftlicher Literatur*. This bibliography is published eight times a year as a free supplement to the periodical *Neue Betriebswirtschaft*, Heidelberg. Non-German members publish the same bibliography under their own names. To print the bibliography the 9-track magnetic tape is converted into a 6-track TTS tape, which can directly feed a Linotype machine.

- In addition to the bibliography, annual registers are produced for the various volumes. These registers are also produced from 6-track TTS tapes.

- The magnetic tapes enable RKW to produce a variety of special bibliographies in a very short time.

The Thesaurus developed by RKW comprises about 3,000 keywords. It has been translated into Dutch, English, French and Spanish.

Any changes to the Thesaurus (corrections and additions) are decided by a board formed by the interested members of the documentation circle.

The system also carries information on the training of top and middle management personnel.

3.2 *The ZAR System of the Zentralarchiv für Empirische Sozialforschung, University of Cologne*

In this system information from social science research surveys is collected, machine processed and made available. Over the last two years the Zentralarchiv für Empirische Sozialforschung has constructed an integrated storage-retrieval and analysis system for surveys (ZAR System). This system is designed to facilitate flexible search strategies to select and retrieve data concerning single indicators (questions, groups of related questions) and surveys; to enable primary survey material to be processed for re-analysis (survey descriptions, code books, verified data); and, finally, to carry out programs for the organisation and analysis of data (recoding, cross tabulation, statistics).

To implement this project the Zentralarchiv had first to develop computer programs for converting the archive holdings into machine-readable format. Programs producing machine-readable code books and machine-readable survey descriptions are now in operation. The code book programs contain routines for data checking and computation of marginals. In order to facilitate international exchange and co-operation, the programs for the production of survey descriptions use input formats compatible with those designed for the Council of Social Science Data Archives (CSSDA) inventory.

The machine-readable code books function as input for the thesaurus of survey questions. The whole question/answer unit (complete question text, answering categories, marginals in absolute figures and marginals in percentages) is stored together with the identification of the question (archive number of the survey, question number and the classification category numbers that apply to the question).

Storage programs had to be developed to handle the immense volume of textual material. The storage technique is based on the principle of splitting question texts into single words, thus building up a word list containing every word that occurs in the text. The texts are stored by replacing the words with an identification number (in binary code) derived from the order of the word in the word list. This technique allows storage of up to approximately 15,000 survey questions together with the complete set of system programs on one disk (IBM 2311).

At present, retrieval strategies can be based on words that occur in the question texts, as well as on questions which can be retrieved by the classification category number of the Zentralarchiv classification scheme for survey questions (600 Descriptors, multiple classification up to 15 entries per question is possible). In due course, it is intended to integrate search strategies by means of conceptual tags which will be derived from the analysis of research reports based on surveys stored in the system.

The question file will be linked to the file of survey descriptions by means of the archive number of the survey stored with each question. In this way the question can be situated with respect to its methodological and contextual properties (sampling procedures, time of field-work, etc.). Programming for storage and retrieval modes of survey descriptions are developed in close co-operation with the Council of Social Science Data Archives, Pittsburgh, USA.

The Zentralarchiv has recently published a compendium of 620 research projects in the field of applied social science with a detailed description of each project: *Empirische Sozialforschung 1968 - Eine Dokumentation* by Thomas A. Herz and Hagen Stegemann, Munich, 1969. Furthermore in November 1969 the Zentralarchiv published on behalf of the International Social Sciences Council Task Force for Information Retrieval in Data Archives a *Report on the Information Retrieval Systems of 3 European Data Archives* prepared by Dagobert Soergel. This report is a collection of information on the SSRC Data Bank, Colchester, Zentralarchiv für empirische Sozialforschung, Cologne, and Steinmetz Stichting, Amsterdam, using a unified description scheme for such documentation centres.

3.3 *Koordinierungsstelle für die Dokumentation sozialwissenschaftlicher Forschung*

The Co-ordination Bureau for Documentation of Social Sciences Research is the administrative base for continuous (once a year) enquiries about research projects in social science. It was established in autumn 1968.

Organisation:

(a) Voluntary co-operation of - at present - five institutions which carry out or plan documentation of research projects in the social sciences, i.e.

- Arbeitsgemeinschaft sozialwissenschaftlicher Institute e.V. (ASI), Hamburg
- Max-Planck-Institut für Bildungsforschung, Berlin
- Leitstelle Politische Dokumentation, Berlin
- Pädagogisches Zentrum, Berlin
- Zentralarchiv für Empirische Sozialforschung an der Universität Köln, Cologne

(b) The Co-ordination Bureau is attached to the ASI. It organises the enquiries and controls the return of the questionnaires.

(c) The activities of the Bureau are sponsored by the Institut für Dokumentationswesen, Frankfurt and the Stiftung Volkswagenwerk, Hanover.

Object of enquiry:

Research projects in the social sciences (from theses to major projects), published, current, or planned in sociology, political sciences, and educational research in the Federal Republic of Germany.

Aim of co-ordination:

By abandoning their hitherto separate enquiries the co-operating members of the Co-ordination Bureau will release the research institutes from having to answer several enquiries from various points, all asking nearly the same questions. This procedure should increase the total return and stimulate the information in interdisciplinary research and between research and practice.

Methods:

(a) The members of the Co-ordination Bureau provide the Bureau with their address lists together with selected lists of subjects in which they are interested (Interest profiles).

(b) The Bureau organises a central index of addresses, which includes research institutes as well as science foundations and government bodies, and sends out a standardised questionnaire (with 16 categories). After three months the institutions receive a follow-up letter.

(c) The returned questionnaires are distributed to the members in accordance with their lists of interests.

Utilisation:

The first co-ordinated/centralised enquiry in this field was carried out in 1968/69 and 1,645 institutions received a questionnaire; 1,058 questionnaires were returned (65%).

(a) In November 1969 a first draft of the register of titles was published, including a report on the enquiry and the total return, classified by permutation (according to the lists of interests of the members), and giving title, author and institute for each project.

(b) A comprehensive register and/or individual specialised publications will be issued during 1970, and will include complete project descriptions.

3.4 *Dokumentations- und Ausbildungszentrum für Theorie und Methode der Regionalforschung (DATUM)*, Bad Godesberg.

The main function of this institution is research and training in the field of regional planning, city planning and allied fields. Furthermore, information on the results of surveys and public administration data (statistics, tax data etc.) are collected according to a location index, processed mechanically and made available for retrieval.

Details are described in a brochure about the activities of DATUM, which is available free of charge on request.

3.5 *Overseas documentation* (Übersee-Dokumentation)

In co-operation between the German Foundation for Developing Countries (Deutsche Stiftung für Entwicklungsländer DSE), and the German Overseas Institute (Deutsches Übersee-Institut, Hamburg), a documentation system on research and field studies in developing countries has been established.

The documentation centre of the DSE collects and processes machine-readable data on projects concerning developing countries, on experts and institutions working in this field, and on literature concerning development aid.

The Deutsche Übersee-Institut links four regional institutes which also act as documentation centres or clearing houses for their regions: the Deutsches Institut für Afrikaforschung, the Institut für Asienkunde, the Institut für Iberoamerika-Kunde, and the Deutsches Orient-Institut. In this way all those documents are collected and evaluated that are necessary for interdisciplinary regional research and for contacts with developing countries.

The indexing of the material will be done by descriptors from a thesaurus which is being developed. Later on punched paper tape will be used for mechanised data processing.

3.6 *Bibliographies concerning the social sciences*

The most important bibliographies and documentation services in the field of the social sciences are listed at the end of this report. The list was established for OECD's *Information Services and Projects in the Social Sciences.*

4. TWO EXAMPLES OF FULLY MECHANISED INFORMATION SYSTEMS (the German National Bibliography and IFIS)

4.1 *Computerised Processing of the* Deutsche Bibliographie *(German National Bibliography)*

The *Deutsche Bibliographie* is prepared by the Deutsche Bibliothek at Frankfurt and currently catalogues German publications and publications written in German. The *Deutsche Bibliographie* can be considered as a comprehensive and general documentation of German publications. It is published in several series and in various issues.

Series A announces publications available through the book trade. The catalogue is published weekly. This weekly issue has a bibliographical section grouped under 26 subject headings. It includes a combined author-keyword index and a publisher index. About 500 titles are announced weekly. In addition the combined author and keyword index is cumulated monthly and quarterly.

Series B contains publications from outside the book trade. It is published every two weeks and, like series A, includes a bibliographical section and a combined author-keyword index. The combined index is cumulated annually.

Series C announcing maps and charts appears every three months. It is organised like series A, having a bibliographical section, a combined author-keyword index, and a publisher index. The combined author-keyword index is cumulated annually.

A half-yearly catalogue (*Halbjahresverzeichnis*) is published every six months and includes all series A entries and selected entries of series B as well as the most important publications of Swiss and Austrian publishing houses. The half-yearly catalogue is divided into three parts:

- Title entries in alphabetical order of authors names or, in the case of anonymous publications, of the first significant word of the title. There are references to second, third and further authors.
- Index of keywords taken from titles (Stichwort-Verzeichnis).
- Index of keywords expressing the content of a document, in alphabetical order: each keyword is followed by the corresponding title entries (Schlagwort-Verzeichnis).

Each half-yearly catalogue contains 1,600 to 1,800 pages.

The five year cumulation (*Fünfjahresverzeichnis*) is the cumulation of ten half-yearly catalogues.

For many years these editions could not be published on time. Lack of staff and the constantly increasing number of publications account for why the Deutsche Bibliothek fell behind in its bibliographical activities during the last ten years. The 1965 half-yearly catalogues finally appeared fifteen to eighteen months late, and we are having to wait more than ten years for the five year cumulation for 1961-1965. The Zentralstelle für maschinelle Dokumentation (Centre for Mechanised Documentation) in co-operation with the Deutsche Bibliothek therefore took up the project of mechanising the *Deutsche Bibliographie*. This was a completely new task. The bibliographical records are now processed from 8-track paper tape. After several computer runs based on a large series of programs (Check, Correction, Preparing, Assembling, Sort and Merge, Lino Programs) all data processed for printing are output on 6-track paper tape which operates the Linotype linecasting machine, thus enabling the computerised National Bibliography to be printed correctly from a pleasing typefount having the necessary variety of characters. Furthermore, all the indexes are composed of material taken from the title entries of the weekly issues and are generated by computer. After the first punching of the title no manual work is involved.

The mechanisation of the German National Bibliography allows the publication of the half-yearly catalogue and the five year cumulation much earlier than before. Moreover the manual work of sorting and the manual setting of the cumulated issues and indexes are avoided. At present there is a great difference between the working speed of the computer and that of the linecasting machine. The output of the computer exceeds 1,000 characters/sec while the casting machine sets only 3 to 4/sec. Therefore it is considered necessary to use photosetting equipment. Its working speed approaches the speed of the computer. As well as the increase in typesetting speed (about hundredfold), an almost error free setting of the computer output will be possible. At present a Linotron 505 is installed in the Zentralstelle für maschinelle Dokumentation and will be producing, from 1971, the five year cumulations very shortly after the corresponding period.

4.2 *International Food Information Service (IFIS)*

In order to fulfil a growing demand for an information service in the field of food science and technology, a new abstract journal *Food Science and Technology Abstracts* has been available since the beginning of 1969.

The journal is published by the International Food Information Service (IFIS) the main partners of which are: the Commonwealth Agricultural Bureaux (CAB), United Kingdom, the Institute of Food Technologists (IFT), USA, Institut für Dokumentationswesen (IDW), Federal Republic of Germany, and the Centrum voor Landbouwpublikaties en Landbouwdocumentatie (PUDOC), Netherlands.

This new international activity is interesting, not only because of its organisation but also from the point of view of its division of labour and use of modern equipment. It may therefore serve as a model for other international information systems, in the field of education for example.

Organisation:

The International Food Information Service is supported by the institutes mentioned above. Each of the institutes from the four countries is represented by two (Netherlands one) members on a Management Committee which is responsible for laying down guidelines for policy and, especially, for the division of labour and for financial and administrative questions. The initial agreement is limited to three years. During this period experience will be collected of the function of an international information service. It is hoped that the agreement can be prolonged after the three years and that the system will become self-supporting.

Division of labour:

The evaluation of literature on food science and technology from all parts of the world and the main editorial work is the responsibility of the Editorial Office in the United Kingdom. Part of the relevant literature is handled by this office and part by PUDOC in the Netherlands. Patent specifications are evaluated through the US IFT. Other organisations also contribute, on a contract basis, by evaluating literature from their country. The Institute for Scientific and Technical Information in Agriculture, Prague, is responsible for preparing abstracts from journals from Eastern European countries. The Japanese section of the Institute of Food Technologists is concerned with literature from Asia.

The German IDW is responsible for processing the material, with the assistance of the Zentralstelle für maschinelle Dokumentation. The Editorial Office in the UK sends the material weekly to Frankfurt, where it is punched onto paper tape, processed by the computer of the ZMD and printed, at present by Linotype but in future photosetting devices will be used. The program system of this project is based on the German National Bibliography programs (see 4.1).

Electronic data processing:

Electronic data processing has the advantages of providing mechanical preparation of monthly subject and author indexes together with the abstracts (1,000 abstracts monthly). Moreover cumulated yearly author and subject indexes are produced and distributed with the final number of the journal for each year. The bibliographic references and the abstracts are stored on magnetic tape. It is intended to offer these tapes to the users who will thus be able to build their own data bases. Special bibliographies will be prepared tailored to the requirements of the customers. Moreover a system is being built up for answering special enquiries, (information retrieval).

This report could not be comprehensive. It could only briefly describe a small number of projects to indicate main lines of development in the Federal Republic of Germany. Some of these projects contain elements which could usefully be taken into consideration in establishing a European network of documentation and information centres for education.

LIST OF BIBLIOGRAPHIES CONCERNING THE SOCIAL SCIENCES

1. *Documentatio Geographica*

   Bundesforschungsanstalt für Landeskunde und Raumordnung
   53 Bonn - Bad Godesberg, Michaelshof

   Geography
   400 journals scanned
   Frequency: bi-monthly with annual cumulations

2. *Bibliographie Schulfernsehen*
   Bibliographie Fernsehen und Jugend

   Internationales Zentralinstitut für das Jugend- und Bildungsfernsehen
   8 Munich, Rundfunkplatz 1

   Education and television
   613 titles

3. *Karlsruher Juristische Bibliographie*

   C.H. Beck-Verlag
   8 Munich 23, Wilhelmstrasse 9

   Law
   650 journals scanned,
   Frequency: monthly

4. *Bibliographie zur Organisation von Staat, Verwaltung, Wirtschaft*

   Grote'sche Verlagsbuchhandlung
   507 Bergisch-Gladbach, Oberheidkamperstrasse 82

   Organisation of governmental and industrial administration,
   70,000 titles under
   10,000 subject headings

5. *Bibliographie betriebswirtschaftlicher Literatur*

   Verlagsgesellschaft Neue Betriebswirtschaft
   69 Heidelberg, Postfach 1920

   Management Science
   700 journals scanned
   Frequency: 8 times a year with annual index

6. *Dokumentation zum Leistungssport*

   Deutsche Sporthochschule
   5 Cologne, Carl-Diem-Weg

   Sport
   1,100 abstracts per annum
   Frequency: bi-monthly

7. *Bibliographie Pädagogik*

Verlag Julius Beltz
Weinheim, Am Hauptbahnhof 10

Education
430 journals scanned
Frequency: bi-monthly

8. *Rabels Zeitschrift für ausländisches und internationales Privatrecht*

Verlag J.C. B. Mohr (Paul Siebeck)
74 Tübingen, Wilhelmstrasse 18

Law
100 abstracts annually
Frequency: quarterly

9. *Dokumentation Sportmedizinischer Literatur*

Institut für Sportmedizin
Münster, Horstmarer Landweg 39

Sports medicine, physiology and hygiene
2,400 abstracts annually
Frequency: monthly

10. *Bibliographie der Sozialwissenschaften*

Verlag Vandenhoeck und Rupprecht
34 Göttingen, Postfach 77

Economics, Law, Social Sciences
384 pages

11. *Referateblatt zur Raumordnung*

Carl Heymanns Verlag,
Cologne, Gereonstrasse 18-32

Regional planning
300 abstracts
Frequency: quarterly

12. *Dokumentation für Presse, Rundfunk und Film*

Zeitungs-Verlag und Zeitschriften-Verlag
532 Bad Godesberg, Wurzerstrasse 46

Press, Radio, Cinema
100 journals scanned
Frequency: quarterly

13. *Politische Dokumentation*

Verlag Dokumentation
8023 München-Pullach, Jaiserstrasse 13

Political science
3,000 abstracts annually
Frequency: monthly

14. *Parlamentsspiegel-Kartei*

Landtag Nordrhein-Westfalen, Düsseldorf

Law, policy
15,000 abstracts annually
Frequency: bi-weekly

15. *Dokumentation abgeschlossener und laufender Forschungsarbeiten auf dem Gebiet des Städtebaues, Wohnungs- und Siedlungswesens*

Deutscher Verband für Wohnungswesen, Städtebau- und Raumplanung e.V.
5 Cologne, Wrangelstrasse 12

Urban studies and town planning
100 research projects

16. *The general enquirer, approach to an international retrieval system for survey archives*

Zentralarchiv fur empirische Sozialforschung
5 Cologne, Bachemer Strasse 40

Research and development of retrieval systems for survey data archives

17. *Erfassung psychologischer Forschungsprojekte*

Psychologisches Institut der Universität des Saarlandes
66 Saarbrücken

Psychology

18. *Dokumentation zur Raumordnung*

Institut für Raumordnung
532 Bad Godesberg, Michaelshof

Regional planning

19. *Titelliste über Projekte sozialwissenschaftlicher Forschung, Ergebnis der Umfrage 1968*

Koordinierungsstelle für die Dokumentation sozialwissenschaftlicher Forschung
5 Cologne, Bachemer Strasse 40

Education, Social Sciences

20. *Empirische Sozialforschung 1968*

Zentralarchiv für empirische Sozialforschung der Universität Köln
5 Cologne, Bachemer Strasse 40

Empirical social research

MECHANISED PROJECTS IN LIBRARY WORK IN THE NETHERLANDS WITH PARTICULAR REFERENCE TO EDUCATION

by *W F de Regt*

A working party of the professional library and documentation associations has published a report: *Reële automatiseringsmogelijkheden in Bibliotheek en Literatuurdocumentatie* (practical possibilities of automation for library and literature search). This report, being a state-of-the-art report for 1968, gives detailed information on hardware as well as on software. It is based on detailed descriptions of eleven advanced automation projects in the library and documentation field, and gives special attention to the establishment of the need for automation.

A number of activities have recently been started in the field of mechanisation of information storage and retrieval in university libraries and other educational information centres.

Characteristic of the Netherlands approach is that research activity is distributed widely throughout the country. Thus, the various aspects of mechanisation are studied at different places. Within this pattern there are some institutes which have already achieved results, others are busy with experiments, and a few have set up study groups.

In this report the relevant projects are given under three headings:

(1) Systems operating,

(2) Research projects in progress,

(3) Research projects proposed or under study.

It is noteworthy that the lead in mechanisation has been taken by the Netherlands Technical Universities, closely followed by the Royal Library.

In general, it can be said that the projects are concerned with the more bibliographical aspects of the mechanisation of the information function. There are examples of storage-only activities (Rotterdam, Delft). Storage and retrieval combinations, with search potential (on-line and real time or time sharing) have not so far been realised.

It may be expected that in the near future the mosaic of research activity will be co-ordinated and will receive new impetus and more funds under the national science policy for scientific and technical information.

SUMMARY OF PROJECTS

1. SYSTEMS OPERATING

a) *Organisation* : Technical University of Delft, Central Library
DELFT

Objectives : Retrieval system for obtaining requested books from closed stacks

Computer : IBM 360/65 and Telefunken TR 4

Relevant facts : The system can be described as an on-line real time system with an Ericson handling device, a paper-tape keypunch, an output typewriter and a display apparatus.

It serves a collection of 120,000 books and 200,000 bound volumes of periodicals, mainly in the natural sciences.

2. RESEARCH PROJECTS IN PROGRESS

b) *Organisation* : Royal Library (National Library)
Union Catalogue of Periodicals (CCP)
THE HAGUE

Objectives : Periodic print-out of the up-dated contents of the union catalogue of periodicals, and according to need, the production of subject lists and possession-lists.

Computer : IBM 1428 optical character reader

Relevant facts : Bibliographic system, with direct magnetic tape memory, IBM 1410 sorter and IBM 1460 printer. The program runs for a collection of 300,000 periodical cards and is a research project to obtain information and experience for mechanising the union catalogue of books.

c) *Organisation* : Technical University of Eindhoven
Central Library, Periodicals Department
EINDHOVEN

Objectives : The administration of periodicals and the regular print-out of a catalogue, alphabetical and by subject.

Computer : IBM 360/30, 64 K

Relevant facts : Bibliographic system for registration, claims, renewal and binding.

The collection comprises 50,000 issues a year of 2,500 periodical subscriptions.

d) *Organisation* : Technical University of Twente
Central Library
ENSCHEDE

Objective : The production of a catalogue, by subject, of the total book collection.

Computer : IBM 360

Relevant facts : The project is limited to the production of an alphabetical list of subject headings related to book number.

Future expansion will be found in the relation to author and geographical facets.

e) *Organisation* : Roman Catholic School of Economics
Central Library
TILBURG

Objectives : The administration of periodicals and the print-out of a list of periodicals.

Computer : Use of service institute.

3. RESEARCH PROJECTS PROPOSED OR UNDER STUDY

f) *Organisation* : School of Economics, Central Library
ROTTERDAM

Objectives : Retrieval system for obtaining requested books from closed stacks.

Computer : ---

Relevant facts : Electronically controlled retrieval system, known as *Randtriever*, using a control station with rotable input keyboard and an electronic sensing head, reading punched cards. The documents to be retrieved are housed in storage modules with possible extension to any length and depth. By using the Master Column and the Extractor any module can be mechanically extracted from the module file and be delivered at the control station.

g) *Organisation* : Working group of University Libraries in the Netherlands.
Central address: University of Utrecht
UTRECHT

Objectives : Study of search formulation and file organisation related to the mechanisation of the alphabetical catalogues.

h) *Organisation* : School of Theology, Central Library
AMSTERDAM

Objectives : Mechanisation of the cataloguing system, including author catalogue and subject catalogues.

Computer : ---

Relevant facts : Detailed analysis of relevant facts, description of all necessary steps for the design of a program.

i) *Organisation* : Ministry of Education and Sciences, Department of Documentation - Study Group
THE HAGUE

Objectives : Study of search formulation and file organisation related to the mechanisation of production of the *Pedagogische Bibliografie* (Educational Bibliography).

SOCIAL SCIENCE DOCUMENTATION IN SWEDEN WITH EMPHASIS ON EDUCATION

by *N Lalander*

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1. SITUATION IN THE DOCUMENTATION FIELD

A working group for information and documentation questions within the social sciences, appointed by the Swedish Government Research Advisory Board, an organ directly responsible to the Prime Minister, presented on December 19, 1967, a *memorandum* containing an appreciation of the situation prevailing in the documentation field and a number of proposals for immediate measures.

The working group's conclusion is that no complete documentation service within the social sciences exists at the moment. Even if a considerable amount of documentation work is being done, it is split over a number of institutions in an incomplete form. There is neither a uniform documentation system nor a co-ordinated plan for documentation which covers the entire field of social science.

The work is not based on a detailed plan on uniform lines. The resources are divided among different organs for collection, application, and information, and the documentation work is described as ineffective, irrational, demanding in personnel, and expensive.

What the tasks of documentation should be, and the requirements one should be entitled to place on it, are indicated in a number of points.

The working group also states its opinion on organisational problems. It proposes the creation of an independent documentation unit for the social science field. This unit should come under the Ministry of Education and be responsible for and direct the documentation activities in this field which should exist in Sweden. Among other tasks, the central documentation unit should co-ordinate purchase and domestic distribution of foreign documentation, especially of such forms as make use of modern data processing and telecommunications techniques. Swedish material should be so documented as to be directly suited to foreign needs and interests.

In order that the developments within social science documentation may be kept under constant supervision, it is proposed that a committee be established with representatives of ministries, research councils etc. This committee should initiate, draft and propose measures which it considers necessary, and should maintain intimate co-operation with the aforementioned documentation unit.

The memorandum recommends the use of modern documentation techniques without specifying what courses and methods should be adopted.

At the time of issue of the memorandum a number of groups of experts within government departments, organisations and scientific institutes had over longer or shorter periods, and without appreciable contact with one another, studied problems associated with documentation work and of modern processing techniques.

The Joint Delegation of the Research Councils, through a working group for documentation and information questions, had attempted to survey the documentation activities within the field of the government research councils.

This group is investigating the possibilities of the use of ADP (Automated Data Processing) to provide quick handling of information in the social science and similar fields and has suggested the institution of experimental work in the social science field.

Since the *State Council for Scientific Information and Documentation* (SINFDOK) started its activities in the autumn of 1968, however, the working group of the Joint Delegation of the Research Councils for documentation and information questions had been inactive.

The government research councils have received directives from the Ministry of Education to consult SINFDOK on informational and documentational questions. SINFDOK has been linked via the Board of Technological Development to the Ministry of Finance and is expected later to be transferred to the Ministry of Education.

SINFDOK has hitherto concentrated mostly on informational and documentational questions in the technological development field and has not yet had time to get to grips with the corresponding problems for the social sciences.

The *Parliamentary Auditors* have also pointed to the new possibilities offered by modern technique in documentation and information work. This they did in Memorandum No. 6/1968 drawn up after a decision of May 28, 1968, concerning the status and functions of the Parliament Library within the national library service.

The views of the Parliamentary Auditors apply chiefly to the administrative structure of the national library organization, concerning which no unanimity exists among the interested parties. Comments on the Memorandum by the various bodies to which it has been submitted for an opinion have not yet been received.

The State Council for Scientific Information and Documentation, however, recommends that the whole question of the co-ordination of the informational resources of research, administration and parliament be subjected to unconditional examination after the total need for information has been established.

SINFDOK says in its comments on the Parliamentary Auditors' proposals that documentation in the social science field has been neglected for a long time. Some of this work should be done with mechanical aids. It is therefore urgent that the memoranda, records, communications etc. of government committees be drawn up to a uniform pattern. This will enable such information to be fed into a mechanized system *without lengthy and costly work by qualified personnel* (Author's italics). The working group appointed by the Research Advisory Board had earlier put forward similar points of view.

A general classification scheme should also be created for public administration.

A list of present government committees should be drawn up and the Parliament Library should conduct experiments in the use of mechanical documentation methods.

Various bodies are at present examining problems concerned with documentation and data processing. One such body is the National Office for Administrative Rationalization and Economy, which has made a study of the internal organization of the scientific libraries.

The research libraries come under the *Office of the Chancellor of the Universities*, which has a special ADP committee for these libraries and the Royal Library in Stockholm, which is at the same time a university library. The Office of the Chancellor of the Universities in turn comes under the Ministry of Education, as also does the Research Library Council. *The Swedish National Committee for Documentation* comes under the Academy of Science. The National Committee is to draw up a programme of action in the field of documentation and is continuing its work even since the creation of SINFDOK. Similar activities are being conducted in the technological, medical and other natural science fields. Individual organizations and local authorities are carrying out their own investigations and making certain experiments in the documentation field.

The National Office for Administrative Rationalization has reached the final stage of a preliminary study of how the main scientific libraries and institutional libraries function. This includes a preliminary study of ADP in libraries, and of other alternatives and models, and a summing-up of the experience from other quarters.

The next job on hand is a classification of projects. It is an entirely open question whether general solutions should be sought or whether different solutions for different scientific libraries must be found having regard to the facts of the situation and to the available resources. No report on the experiments can be expected before the end of 1969.

2. EXPERIMENTS WITH ADP IN THE RESEARCH LIBRARIES

As regards the investigation into the use of ADP in the research libraries the following may be said.

The Committee for ADP in Research Libraries, appointed by the Chancellor of the Universities in 1964, has studied the use of mechanical aids in scientific libraries, but in particular has conducted experiments with ADP in the research libraries, on which subject it has issued a large number of reports over the years. An extensive report on the work of the Committee is awaited in May-June 1969.

The reason why the Committee has tried out ADP for the production of catalogues is the time-consuming manual work involved in this process. One of the advantages of ADP in cataloguing work is that, once the entire title registration has been completed, a single input for each catalogue data item is all that is necessary. Once the title registrations with all references, systematic codes and descriptors in the form of data items have been fed into an ADP system, the means exist for producing from the collected material all the physical catalogues and bibliographies desired, as to both form, content and layout, i.e. catalogues in card or book form, acquisition lists, union acquisition lists, national bibliographies, library catalogues and special bibliographies of different kinds, instead of a repetition of the technical procedure according to card system, lists, etc.

The *Union Catalogue of foreign literature (Accessionskatalog)* for some 150 participating libraries records new acquisitions on an annual basis. The time lag in its publication has become increasingly serious, finally amounting to several years. It is divided into two alphabetical series: AKB, which lists books and congress records and, in some volumes, the contents of periodicals, and AKP, comprising current journals and *Arts* (during the period 1956-63).

The work-load has become increasingly heavy. After receipt of catalogue cards from the participating libraries there follows the sorting of the cards into three files according to type of publication, into alphabetical order and into chronological order, editing and checking of particulars, typesetting (at the rate of 32-48 galley proofs per week), proof-reading, revised proof, check of corrections, second revision and check of same, and printing. The circulation has varied around some 2,000 copies.

To return to the original cataloguing, the effective time spent per catalogued title is calculated to be between 30 and 45 minutes. The production of an ordinary card catalogue is calculated to take about 25 minutes per title after cataloguing has been completed. Considerable savings of time can be gained through ADP.

Since the Committee decided on the use of ADP for issue of the Union Catalogue, it has produced a joint list of new book acquisitions for six large Swedish libraries on an experimental basis.

From December 1966 to March 1967 an experimental series was issued under the title ANB-B in six numbers. Two numbers were classified for different research categories. One was a cumulative three-month catalogue. All catalogues were systematically classified.

The aim has been that the editing work should be done by the computer as far as possible. The data item is edited after read-in. Page numbering, subject headings etc. are generated automatically. The input item is punched on tape in accordance with specific editing rules. After proof-reading and correction routines the item tape and correction tape are read into the computer. After computer editing and alphabetical sorting a revised proof is printed, read and corrected. After a computer correction routine the items are sorted by subject groups. The catalogue pages are edited and the original lists for ANB-B are printed on the computer's line printer on lists in A4 format. Cumulative catalogues can be produced on the basis of the alphabetically sorted indexes for several numbers.

The original A4 lists are then reduced photographically to 75% size, offset plates are prepared and the catalogues are printed. The trial catalogues included more than 6,400 titles.

Experience has led to an increase in the number of subject groups.

The issue of AKN on a regular basis started in the autumn of 1967. The catalogue has been divided into two series of systematically classified fascicules: AKN-Hum includes humanistic and social science books, AKN-Nat titles of natural science, technological and medical books.

A number of monthly fascicules in the two series have also been issued. A common alphabetical index has been issued for the cumulative catalogues.

During 1968 eight fascicules were issued within each systematic series. The number of subject groups has been increased to about 150, and a further increase is possible.

In the processing operations the reference numbers are automatically generated before print-out of the systematic original lists. The items are then automatically sorted into the systematic indexes. Cumulative indexes can be produced by joint sorting of alphabetical subindexes. The number of characters has been increased, as has also the number of lines per column. At the same time the reduction factor for the transfer to offset plates has been changed from 75 to 60 per cent.

The intention is hereafter to produce AKP and AKB both as rapidly issued news lists and as more long-term catalogues by means of ADP.

The long-term aim is to create a complete data bank of the holdings of foreign periodicals by the Swedish research libraries, both titles and stock. From the aggregate data bank it will be possible to obtain all types of catalogue information, with titles and stocks in more or less complete form, sorted systematically and alphabetically. They will cover an arbitrary number of subject groups and for varying periods. It is expected that periodical news lists will be issued during 1969, in the form of quarterly issues in the first place.

The model for the system has been the American MARC II project, and the Swedish system will be compatible with the latter. The aim is also to use phototypesetting.

As regards the data bank of the holdings of foreign literature by the Swedish research libraries in the form of books, congress publications and completed serial publications, it is expected that this bank will be arranged as from the present situation. Earlier recorded acquisitions will be introduced retrospectively into the bank only to a limited extent. The intention is to be greatly restrictive also in respect of books older than, for example, five years.

The Committee presumes that in future there would be a *common data processing centre for the Swedish libraries*, to which will be connected terminals at the major research libraries, which in turn will form central points in a national network of libraries.

A similar procedure will be adopted for Swedish as for foreign literature.

It will be possible to run magnetic tapes from the national libraries of the U.S.A. and U.K. in the data processing centre of the Swedish libraries. Local institutions will also be able to report their new acquisitions to the data bank.

The aim is that ADP of the library routines shall be in operation by the mid-seventies. After that time a total integration of the library routine and other library work can take place. Through the various connections in a network of terminals all over the country to the central purchasing, loan statistics and census indexes, central control can be exercised over acquisitions and loans and over the entire national need for foreign literature.

On the basis of MARC II, integration with new international documentation systems will be possible, whereby selective notification of information can also be offered.

3. TEACHING AIDS DOCUMENTATION

The *Board of Education*, which comes under the Ministry of Education, has since 1966 been engaged on the construction of a system for the recording of printed and unprinted teaching aids (AV aids etc.). To start with, two groups were engaged on this project, a Category Group for teaching aid index systems and nomenclature, and a Subject Group for subject classification, which drew up a joint proposal. From the end of 1967 a working group for the further development of the indexing of teaching aids started to plan trials with the new index system. During the present academic year these trials have been in progress at three schools.

The requirements set up for a uniform indexing system for school teaching aids may be summarised as follows.

The system must be easily understandable by pupils. It must facilitate teachers' planning work and save them time in the search for different aids when planning a new project.

The system should be based on existing curricula.

Changes in teaching aid stocks must be effected quickly in response to changes in curricula and syllabi. It is assumed that the successive overhaul of teaching aids at the school unit shall take place under the supervision of an education specialist. A proposal for the establishment of special supervisor appointments (*skolintendenter)* has been made by a committee including representatives of the Board of Education and personnel organisations.

The system must also be applicable to every kind of teaching aid, and the present confusion must be abolished. The system must be of universal applicability in the sense of being applicable within different types of school.

The system should provide means for consumer information and serve both producers and consumers alike. It should reveal in what sections of courses there are blank spaces as regards teaching aids, as this gives valuable guidance in the development of new teaching aids.

The system should allow of data processing. Practical trials would appear to be indispensable.

Three main principles are followed in the systematization of teaching aids, *category classification*, *subject-matter classification* and *usage grouping*.

An indexing system is used in two dimensions. In a biaxial system of co-ordinates the x-axis is subject axis, the y-axis category axis.

In this way a teaching aid is identified by indication of the co-ordinates for a point in the plane (as shown in the diagram overleaf).

The *category* of a teaching aid is expressed by a six-figure number. The first two figures indicate the main category.

The two intermediate figures indicate subcategory.

The last two figures indicate sub-subcategory.

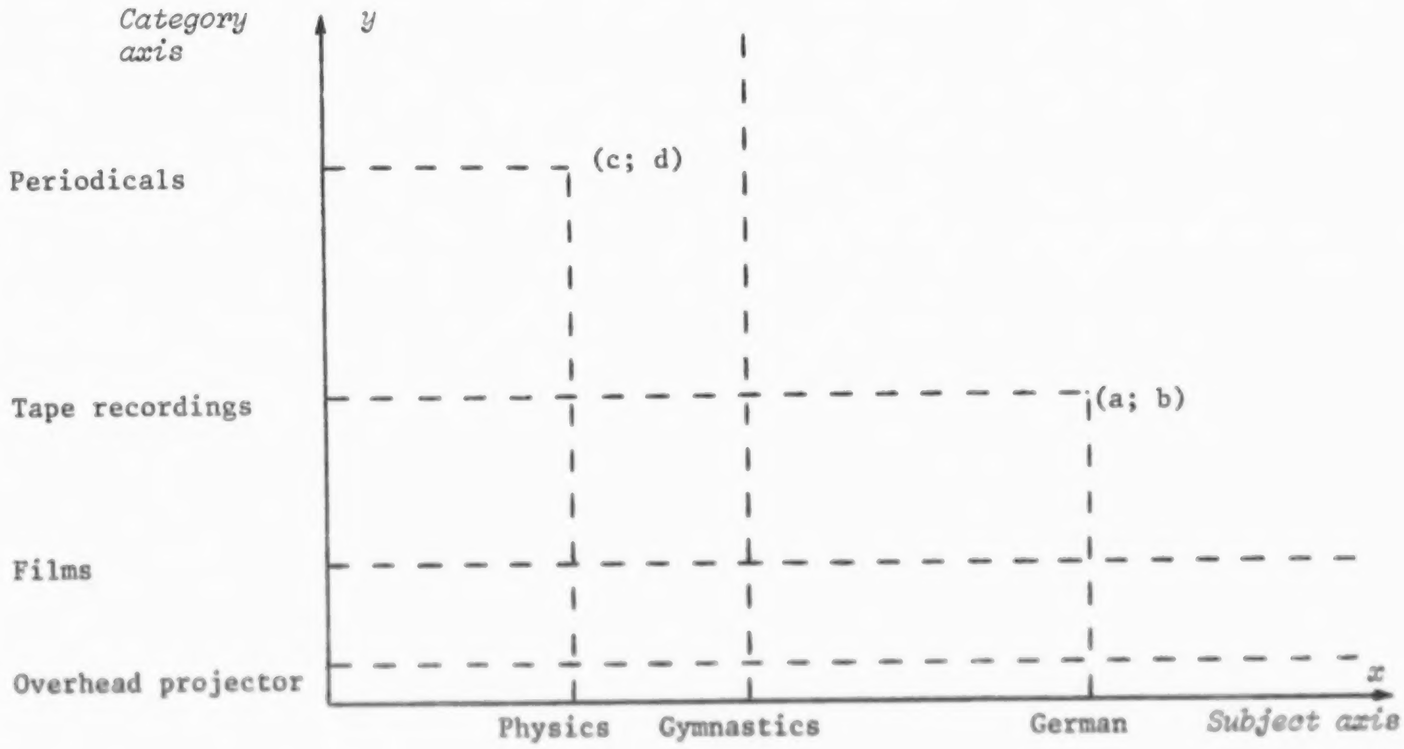
If subcategory or sub-subcategory is unspecified, the corresponding groups of figures consist of zeros. The group 99 is reserved for teaching aids of so special a kind that no specific category can be allotted to them.

The *usage grouping* of a teaching aid is indicated by a four-figure number.

The first two figures indicate the subject.

The last two figures indicate the subdivision of the subject.

The index of teaching aids is given as Appendix 1 to this National Report.



Experience of the *practical trials* of the indexing system for teaching aids shows that the system functions satisfactorily and that computer-stored documentation concerning the stock of teaching aids offers the most practicable solution even for small school units.

Trials are being carried out at the following schools:

1. Anneberg School (lower and intermediate levels), Malmö. About 600 pupils and 20 or so teachers. The cost for ADP input and output and binding of the lists amounted to 4,000 kronor. For this price 40 lists were obtained, separately classified according to category, subject-matter and use. The cost per bound list was 33 kronor.

2. Kvarn School (upper level), Järfälla, with 800 pupils.

3. Mäljes School (B-school with lower and intermediate levels), Finnskoga-Dalby, with 5 teachers and 120 pupils. The computer-printed list of the stock of teaching aids at the school runs to 100 pages.

4. Jakobsberg School (gymnasium), Järfälla, a school under development, at which indexing takes place at the purchase stage.

The total computer cost at the four schools has been 20,000 kronor.

From these experimental schools lists of the stock of teaching aids have been sent to the project supervisor at the Board of Education, where the data have been tabulated.

Every article has been given a serial number. As the number of articles is not expected to exceed one million, a six-figure numbering scheme has been used. The idea is that a serial numbering scheme will make it easy to detect duplications of the same article within one school. One can also see what teaching aids exist at several of the experimental schools.

Particulars of category, subject and stage are also recorded. When a teaching aid is used at several stages or in several subjects, input of all alternatives takes place. Other data recorded are the quantity of a given article within the school unit, the producer of the teaching aid in accordance with a numbered list, year of production, and price class in accordance with a nine-class scale. Price class 1 comprises teaching aids costing less than 10 kronor each, class 9 those exceeding 500 kronor. For these most expensive teaching aids, moreover, the price can be indicated in exact figures.

Each school unit has its individual notation, and the location of the teaching aid is written-in in accordance with a nine-point code.

Cards are punched on the basis of the tabulated data. By sorting the punched cards a complete alphabetical list and lists such as category, subject and stage lists can be obtained.

For printed teaching aids recording is done by book title, followed by the author's name. If the title is not sufficiently informative, a subject indication is given as keyword for the book title.

The investigating group is now prepared to extend the trial on a larger scale. They are willing to submit forms to the teaching aid producers who, in accordance with the indexing system, will enter all necessary data of their stocks, which can then be fed into a central index of teaching aids.

The idea is that a national centre for documentation and information on teaching aids can be established in this way.

Magnetic tapes will be available on loan to local authorities with their own ADP for encoding, for example, the location of their own teaching aids.

Through the use of national and local tapes together, it will be possible for teachers to see what teaching aids for a particular purpose are available locally and what are lacking locally but exist elsewhere.

It is, of course, also possible to have special questions answered, to draw up profiles of interest, and to produce new lists in response to individual desires.

During the budget year 1968/69 the project received 70,000 kronor from public funds; the expected grants for 1969/70 and 1970/71 are 145,000 and 20,000 kronor.

The State Teaching Aids Committee, which has been making an extensive survey of the entire teaching aids question since the early summer of 1966, has worked out detailed plans for practical trials of teaching aids in conjunction with the new comprehensive school curriculum which is being introduced as from the academic year 1970/71. It seems likely that this project will be put into effect. It is considered desirable that the system for indexing teaching aids drawn up by the Board of Education and reported on above should be used in this context. The next points for experimentation are the following category groups: 02.00.00 AV aids, 08.00.00 Literature, and 08.09.00 Reference books, and subcategories of these three main groups.

The trials are to be made in accordance with a special evaluation programme, which should preferably allow for incorporation of the resulting data into an ADP system.

The cost of the trials is to be charged to the producers of the respective teaching aids.

In accordance with the proposal of the Teaching Aids Committee, practical trials are to be made of teaching aids corresponding to those the pupils now receive as gifts or on loan plus supplementary teaching aids for pupils, guides for teachers, plans of studies, etc., which are included in various combinations of teaching aids.

Every producer of teaching aids should also submit for practical testing those teaching aids which, according to the present regulations, are not subject to compulsory examination by the National School-Books Board, an institution which since the mid-1930's has examined all school-books which, as defined in the statute, are to be considered as school-books (supplementary readers, work-books, anthologies at higher levels, AV aids etc. are not subject to examination by the School-Books Board).

The Teaching Aids Committee considers that the authority in charge of the practical trials should be the School-Books Board working in close association with the Board of Education, both of which come under the Ministry of Education.

It is intended that the teaching aid producers shall inform the School-Books Board about teaching aid items or packages which they expect to deliver to comprehensive school classes 1, 4 and 7 for the academic year 1970/71 for compulsory or voluntary practical trials, as the case may be. The report shall be accompanied by a presentation of the teaching aid, comprising a specification of its aims, its relation to the curriculum, and other particulars of significance to its use and evaluation.

A list of the teaching aids accepted for practical trials will be published every year.

After the respective local education authorities have reported their choice of teaching aids to the School-Books Board, the Board of Education - at the request of the School-Books Board - will decide what municipalities shall be included in the practical trials. Within these municipalities teachers and pupils will then submit reports in accordance with special evaluation programmes.

If any selection group considers that a teaching aid is clearly unsuitable, the group must immediately report the fact to the School-Books Board. The Board can then deal with the matter in the ordinary way and may decide to remove the teaching aid from the list of those accepted for practical trial.

Collected data and other information concerning the teaching aid should be compiled in a union catalogue, which may be extended during the three-year experimental period.

According to the proposal the Board of Education and the School-Books Board should be responsible for the detailed preparation of a routine for the practical trials.

As criticism has been directed against certain textbooks on the grounds that they are lacking in objectivity - this applies especially to textbooks on religion and philosophy, sexual instruction and the relations between the sexes, and other social questions - the Teaching Aids Committee considers it urgent that some form of guarantee of the objectivity of teaching aids and of check that they comply with the general educational goals are built into the test system.

In constructing the evaluation programme, therefore, it is important that the objectivity requirement can be met and that the system is so designed that teachers and pupils as far as possible are given the opportunity themselves to judge the textbooks from these aspects. The School-Books Board, furthermore, can itself decide that a special examination should be made of the textbook.

According to the Teaching Aids Committee the evaluation programmes drawn up in certain preliminary trials should, if possible, allow of incorporation of the data resulting from the practical trial in an ADP system.

The Teaching Aids Committee has proposed personnel reinforcements on the School-Books Board and for the development of administrative routines for practical trials in association with ADP systems for indexing of teaching aids, evaluation programmes and informational material on the practical trial system. The Teaching Aids Committee has requested a grant of 130,000 kronor for the budget year 1969/70 and of 150,000 kronor for 1970/71 for putting this project into effect.

4. CONSUMER AND SUPPLIER STUDY CONCERNING TEACHING AIDS

The *National Price and Cartel Office* has been instructed by the aforementioned State Teaching Aids Committee (LU) to investigate the consumer and supplier elements of the teaching aids market from the economic point of view.

One of the objects is, by performance analysis, to chart the purchasing behaviour of different consumer units at the local government level within compulsory and gymnasial types of school, such as headmaster areas, teaching aid centres (incl. AV centres) and school library centres.

The basis for the Price and Cartel Office's study is invoices and other vouchers of purchases of teaching aids within a number of local educational authority areas. Apart from quantifying expenditure on teaching aids, the object is to obtain a survey of the diversity of goods supplied and of the significance of the school as purchaser of various lines of goods.

The intention is that the material, which is to be processed on a computer, for which purpose some form of codification is assumed for teaching aids classification (the Board of Education code is of interest but in such a case must probably be supplemented by another code), shall be supplemented by interviews with the representatives of schools in order to gain an idea of the decision process in the purchase of teaching aids.

When the investigation into the consumer side has been completed in this way, it will serve as the basis for a planned study on the supplier side.

The official report on the consumer study may be expected towards the end of 1969.

5. NEEDS OF EDUCATIONAL RESEARCH

In the autumn of 1968, the *Educational Research Office of the Board of Education* made a survey of the need for documentation and information on the educational research conducted at eight universities or pedagogical departments of schools of education.

The Office reported on the needs of different groups as expressed in answers to a questionnaire and proposed different models for a system of documentation and information which would to some extent remedy serious defects.

Among its proposals was a trial with ADP in which data from the educational research reports of the last five years should be fed into a system which should be tested in respect of the possibility of search according to profiles of interest.

No decision has been made concerning these proposals.

6. PROPOSED NORDIC DOCUMENTATION PROJECT FOR ADULT EDUCATION

On June 30, 1966, a report was presented by a Nordic Committee of experts on national and Nordic documentation in the adult education field.

The committee had been appointed by the Cultural Commission of the Nordic Council.

It states in its report that material for adult education must be taken from a very broad field. The documentation service will therefore be an essential condition for systematic adult education.

The term documentation is taken to include service for groups of consumers based on collection, processing and evaluation, summarizing, abstracting and distribution of material.

The report presents arguments in favour of the economic benefits to be derived from documentation. It is unreasonable that researchers, civil servants, organisational and administrative personnel and instructors/teachers should do what a documentalist can usually do more quickly.

The committee indicates several alternatives. There might be a common Nordic research and documentation centre, or alternatively national centres.

The committee is convinced that from both cost and utilitarian points of view national centralization yields the best results.

Initially documentation would be limited to books and periodicals and other readily accessible material. A fully developed documentation service, however, must also comprise some audio-visual material, historical source material, etc.

A division of the spheres of interest of the individual countries should also be considered. Fields which are relatively unknown in Scandinavia can thus be brought into the picture, e.g. the Spanish-Portuguese language fields. A division on these lines would lead to considerable gains in efficiency and economy.

Groups which should draw benefit from the documentation service are central administration personnel, researchers, union officials, teachers and instructors. One may also count on entirely new consumer groups from widely different fields without "academic" schooling, e.g. from advanced training courses in trade and industry.

A specialised bibliography of adult education exists at present only in Finland. The material in the specialised libraries for education and in the Tampere university library provides a good starting point for the documentation work. The information service must be based on close co-operation between the documentation centres through the exchange of lists of books and periodicals and other compilations

The committee has proposed that adult education documentation be organised on a national basis in association with the university library at Tampere, where there is a chair of adult education, the State Library of Pedagogics and Child Psychology, Copenhagen, the State Library of Psychology and Education, Stockholm, and the Norwegian Educational Library, as the basic material already exists at these institutions. It states further that specialised documentation on adult education should provide valuable experience for the necessary future expansion of the general educational documentation service. (Experiments in adult education documentation were made in Norway in the autumn of 1968. A list has been compiled of the stock of English-language literature on adult education possessed by the Norwegian Education Library.)

The committee's report also contains points of view concerning the personnel question and documentalists' qualifications.

No decision has been made concerning these proposals.

7. CONCLUDING REMARKS

The documentation field in Sweden is very fragmentary, whether viewed in its entirety, within the social sciences, or solely within education and educational research.

The disunity applies not only to opinions concerning needs, methods and system. Administratively there is a lack of cohesion and co-ordination, and a need for a general survey of all the groups within institutions and administrations which are engaged on documentation problems, which in the last resort are responsible to various cabinet ministers and to heads of government departments.

The aim in the creation of a *State Council for Information and Documentation* is, in the long run, to achieve uniformity. The idea is that experience from documentation projects within technology and natural science will in due course benefit the social sciences, when the new techniques have been tried out.

The introduction of a more extensive system in the social science field, however, lies in the distant future. It is unlikely that the political decision-makers will be ready within the foreseeable future - within 10 rather than 5 years' time - to decide either on the system to be adopted or on any major financial investments.

This may possibly be due to the absence of the powerful pressure groups which urge their claims in questions of developments in the field of technology and the natural sciences. Unless a change in the pressure of opinion takes place, no major change is likely to be introduced as regards social science documentation until international developments have convincingly shown that a delay on Sweden's part is no longer justified.

* * *

SWEDISH STATE POLICY

Interview with Lennart Sandgren, *Under Secretary of State, Ministry of Education, concerning the documentation situation within the social sciences, particularly educational research.*

(The interview, which lasted for 30 minutes, took the form of a conversation with questions by the interviewer. The conversation was tape-recorded, transcribed in extenso *and edited. The editing procedure consisted of concentration of the transcription to the full length portions which the interviewer considered most relevant in the context. As, on grounds of space, the interviewer's questions have been omitted, the main words from the questions have in some cases been used as an introductory phrase to the answer for the sake of clarity.)*

No one is satisfied with the documentation situation. The reason why we have taken no action in the Ministry of Education is that nobody knows how documentation problems should actually be solved. If we look at documentation as a whole, we know that there are various activities in progress. Projects with advanced technique are under way, such as MEDLARS at the Karolinska Institutet (College of Medicine in Stockholm).

In the educational field the documentation question has been under consideration for a long time. Many think that the question is solved by procuring a documentalist for an institution or library. Actually no one quite knows what a documentalist is. The Librarian Committee is investigating this question. One must actually start with the question of how documentation should be arranged.

A project which Sweden has been asked to participate in is ERIC. Judging from the discussions, at the OECD Centre for Education Research and Innovation and elsewhere, ERIC admittedly seems to be able to provide a fairly good coverage of what is produced in the USA, but the quality of the material is uneven as it is dependent on how the work is done at the service stations which deliver the basic material. It also seems to be difficult to limit a search to the particular publications which are relevant to the problem. Used in international contexts it seems that the system will reveal the complexity still further.

As regards the survey that is needed of educational research, it would seem that the basic research being done abroad is admittedly of general interest, whereas goal-directed research is to so great a degree tied to national conditions that, apart from comparative education and, for example, questions of methods development, we usually have fairly little to learn even from countries with very advanced educational research. Swedish educational research is not yet so extensive but that, at the present stage, one can gain quite a satisfactory survey of what is being done from project catalogues and similar publications.

The intention is that the State Council for Scientific Information and Documentation shall bring about coordination between different documentation projects in Sweden.

If now, as it is said, there are piles of journals and reports lying around at institutions and libraries, this is merely because of the usual lack of library personnel, not of the need for a documentalist. The flow of information is manifestly so great that the available personnel cannot deal with it. If the terms *documentation* and *documentalist* are then used sufficiently often, some people get the impression that fairly refined methods must be involved.

But as far as the starting up of large and fairly exacting projects in the documentation field is concerned, and the use of fairly sophisticated methods, coordination is desirable and we cannot tie ourselves down to any particular methods without knowing what they can produce. The picture of the documentation field is extremely split, moreover, and the opinions of well-reputed experts are in clear opposition to one another.

It is extremely difficult to indicate any time within which the responsible political bodies may make a decision. In the first place there must be a basis of facts on which a decision can be made. It is naturally important to be able to show a result fairly quickly. On the other hand one wonders whether there is any country which has decided on a system of such magnitude that it can cover the various national requirements. It is conceivable, too, that one never attains to a system which provides full coverage, but must be content with smaller systems and with a hook-up between them.

What can we do but wait and see? We cannot act merely because the situation is difficult and decide on something when one does not know whether it will lead to any result. Among hundreds of alternatives we might choose one which proves to be wrong. That cannot be a sensible course. It is merely a question of taking the matter coolly and being prepared for several years of waiting, perhaps a five-year period, before we can see any solution.

APPENDIX I

TEXTBOOKS AND OTHER TEACHING AIDS

- 01.00.00 AV apparatus
  - 01.01.00 Cameras
    - 01.01.01 Moving-film cameras
    - 01.01.02 Still-film cameras
    - 01.01.03 TV cameras
  - 01.02.00 Sound equipment
    - 01.02.01 Tape recorders
    - 01.02.02 Dictating machines
    - 01.02.03 Amplifiers
    - 01.02.04 Gramophones, record players
    - 01.02.05 Loudspeakers
    - 01.02.06 Earphones
    - 01.02.07 Microphones
    - 01.02.08 Microphone-receivers
    - 01.02.09 Radio sets
    - 01.02.10 Transmitter equipment
  - 01.03.00 Projectors
    - 01.03.01 Overhead projectors
    - 01.03.02 Viewers
    - 01.03.03 Episcopes, epidiascopes
    - 01.03.04 Film projectors
    - 01.03.05 Magnifying apparatus
    - 01.03.06 Miniature slide projectors
    - 01.03.07 TV projectors
  - 01.04.00 TV equipment
    - 01.04.01 TV tape recorders
    - 01.04.02 TV receiver sets
- 02.00.00 AV material
  - 02.01.00 Films
  - 02.02.00 Gramophone records
  - 02.03.00 Recorded tapes
  - 02.04.00 Film strips with sound recording
  - 02.05.00 Negatives
  - 02.06.00 Charts
  - 02.07.00 Mini-charts
  - 02.08.00 Small colour slides
  - 02.09.00 Large colour slides
  - 02.10.00 TV tape
  - 02.11.00 Adhesive materials
- 03.00.00 Articles of clothing
- 04.00.00 Expendable items

- 04.01.00 AV articles
    - 04.01.01 Film
    - 04.01.02 Photographic paper
    - 04.01.03 Recording tape
    - 04.01.04 TV tape
- 04.02.00 Electrical articles
- 04.03.00 Glass and porcelain articles
- 04.04.00 Chemicals, cosmetics etc.
    - 04.04.01 Chemicals
    - 04.04.02 Cosmetics
    - 04.04.03 Pharmaceuticals
    - 04.04.04 Detergents
    - 04.04.05 Medical supplies
- 04.05.00 Foodstuffs
- 04.06.00 Metal articles
- 04.07.00 Paper articles
- 04.08.00 Plastic articles
- 04.09.00 Drawing materials and stationery
- 04.10.00 Textile articles
- 04.11.00 Wood articles

05.00.00 Experimental material

- 05.01.00 General material
- 05.02.00 Power supply equipment
- 05.03.00 Measuring instruments

06.00.00 Furnishing articles

- 06.01.00 Notice boards
- 06.02.00 Gymnasium apparatus
- 06.03.00 Hoisting equipment
- 06.04.00 Household utensils
- 06.05.00 Furniture and textiles
- 06.06.00 Black-out equipment
- 06.07.00 Projection screens
- 06.08.00 Blackboards
- 06.09.00 Bedstead equipment

2

- 07.00.00 Games and occupational material
  - 07.01.00 Gymnastics equipment
- 08.00.00 Literature
  - 08.01.00 General literature
  - 08.02.00 Bibliographies
  - 08.03.00 Instructional and exercise material
    - 08.03.01 Forms
    - 08.03.02 Instructional material
    - 08.03.03 Musical scores
    - 08.03.04 Programmed teaching material
    - 08.03.05 Collections of examples
    - 08.03.06 Directions for studies
  - 08.04.00 Cuttings
  - 08.05.00 Curricula, separate plans of studies, Methodical guides
  - 08.06.00 Official publications
  - 08.07.00 Periodicals
    - 08.07.01 Newspapers, journals
    - 08.07.02 Year-books
  - 08.08.00 Samples
  - 08.09.00 Books of reference
    - 08.09.01 Grammars
    - 08.09.02 Atlases
    - 08.09.03 Dictionaries
    - 08.09.04 Tables
    - 08.09.05 General encyclopedias
- 09.00.00 Machines
  - 09.01.00 Domestic and household machines
  - 09.02.00 Industrial and workshop machines
  - 09.03.00 Office machines
- 10.00.00 Models and specimens
- 11.00.00 Musical instruments
- 12.00.00 Implements and tools
- 13.00.00 Aids for the handicapped
- 14.00.00 Medical supplies
  - 14.01.00 General supplies
  - 14.02.00 Medical instruments
  - 14.03.00 Transport equipment

Comments and definitions on certain categories

In many cases subcategories and sub-subcategories provide a clear indication of what relates to a given main or subcategory. In the following cases, however, explanations and examples have been considered necessary.

01.01.02.	Still-film cameras Includes equipment for reproduction photography.
01.02.00	Sound equipment Covers solely *sound* equipment. Equipment for *both sound and pictures* comes under 01.03.00 Projectors with the exception of 01.04.02 TV receivers.
01.02.04	Gramophones, record players Both terms relate to apparatus for playing of gramophone records. The gramophone, however, has its own amplifier (built-in), while the record player must be connected via a (power) amplifier.
01.02.08	Microphone-receiver Microphone and receiver combined into a unit, usually in the form of a headset.
01.03.00	Projectors Apparatus for optical projection with or without sound.
01.03.01	Overhead projectors Apparatus for projection of 02.09.00 Large colour slides.
01.03.02	Viewing apparatus Including magnifying glasses and pocket lenses.
01.03.04	Film projectors Includes all types of projectors for all kinds and sizes of film.
01.03.06	Miniature slide projectors Apparatus for projection of 02.08.00 Small colour slides.
01.03.07	TV projectors Apparatus for optical projection of pictures on TV screens.
01.04.02	TV receivers Including monitors.
02.01.00	Films All types of film for projectors except small and large colour slides.
02.03.00	Sound recorded tape Exclusively tape with recording. Unrecorded tape comes under 04.01.03 Sound recording tape.
02.04.00	Film strips with sound recording Slide and sound-recorded material for simultaneous use. The slides are usually small colour slides, while the sound recording material may be tape or gramophone records.
02.05.00	Negatives Including X-ray pictures.

02.06.00	Non-transparent charts on paper, board, fabric or the like, flat, rolled or folded. Min. area c. 21 x 30 cm (A4 or equivalent size).
02.07.00	Mini-charts As 02.06.00 but of smaller area. Includes, for example, postage stamps.
02.08.00	Small colour slides Transparent slides separately mounted in frames or in the form of film strips. Max. size of slide c. 8 x 8 cm.
02.09.00	Large colour slides As 02.08.00 but of size larger than c. 8 x 8 cm. (For 01.03.01 overhead projectors.)
02.10.00	TV tape Solely recorded tape. Unrecorded tape comes under 04.01.04 TV tape.
02.11.00	Adhesive materials Specially prepared materials for direct application to an adhesive surface (flannel, bur fastener or the like).
03.00.00	Articles of clothing Include, for example, sports clothes and shoes, protective coats, protective goggles, gloves.
05.00.00	Experimental material Material for laboratory exercises, demonstrations, experiments and exercises for technological and scientific subjects.
06.03.00	Hoisting devices Various types of device attached to wall or ceiling, or detached, used chiefly for raising charts or the like so that they may be seen by all viewers.
07.00.00	Games and occupational material e.g. puzzles and therapeutic material.
07.01.00	Gymnastics equipment Equipment used for games and athletic exercises, e.g. balls, javelin, shot and discus.
08.04.00	Cuttings Includes collections of postage-stamps.
09.01.00	Domestic and household machines e.g. electric whisks, washing-up machines etc., and also electric ranges, hot cupboards, and refrigerators and freezers.
09.03.00	Office machines e.g. typewriters, calculators, thermal and photo printing apparatus. n.b. Also slide-rules.
10.00.00	Models and specimens e.g. stuffed animals, biological models, skeletons and skeletal parts, geological and historical collections (including dummies). Also collections of coins.

12.00.00	Implements and tools Hand-tools, e.g. for earth-work, agriculture, fishing, kitchen-work, cleaning, e.g. spades, ploughs, fish-traps, whisks, carvers, brooms. Tools for working solid material or for holding work-pieces, e.g. knives, scissors, drills, files, screwdrivers, pliers, vices.
13.00.00	Aids for the handicapped e.g. artificial limbs, wheel-chairs, sticks for the blind magnifying devices for the weak-sighted.
14.02.00	Medical instruments e.g. surgical instruments, hypodermic syringes, X-ray apparatus.

APPENDIX II

USAGE GROUPING

No.	*Subject*	*Swedish Abbreviation*	*Subdivisions*	*Notes*
00	General			
01	Automatic data processing	Adb		
02	Child care	Bv		
03	Biology	Bi	00 General 01 Animals 02 Man 03 Nature conservation 04 Plants	
04	Building	Bt	00 General 01 Civil engineering 02 Building technique 03 House and town planning 04 Construction B 05 Production B 06 Water, heating and sanitation	
05	Danish	Da		
06	Electrical engineering	Elt	00 General 01 Electrical installation 02 Electronics 03 Electric power 04 Electricity 05 Electrical machines 06 System engineering 07 Telecommunications	Automatic control El, see Reg
07	English	Eng		
08	Ergonomics	Erg		
09	Instruction in family matters	Fam		Teaching aids only for the entire subject. See also Sk.
10	Films	Film		
11	Philosophy	Fi		
12	Finnish	Fin		

No.	*Subject*	*Swedish Abbreviation*	*Subdivisions*	*Notes*
13	French	Fr		
14	Physics	Fy	00 General	Electricity, see Elt
			01 Astronomy	
			02 Nuclear physics	
			03 Mechanics	
			04 Wave motion (incl. accoustics and optics)	
			05 Thermodynamics	
15	Business management subjects	Fö	00 General	
			01 Distribution	
			02 Business management	
			03 Administration	
			04 Accountancy	
			05 Law	
16	Geography	Ge	00 General	Incl. Economic geography
			01 Africa	
			02 America	
			03 Asia	
			04 Australia	
			05 Europe, excl. Sweden	Entire Soviet Union
			06 Polar lands	
			07 Sweden	
17	Geology	Gl		See also Fy, Ke, Ge
18	Greek	Gre		
19	Gymnastics	Gy	00 General	
			01 Dance	
			02 Physical education	
			03 Games, athletics sports	
20	Regional geography and folklore	Hb		Exclusively teaching aids designed directly for the subject. See also Bi, Ge, Hi, Sk etc.
21	Domestic science	Hk	00 General	
			01 Home and clothing	
			02 Housekeeping	
			03 Care of clothes, laundry	
			04 Dietetics, cookery	
22	History	Hi	00 General	
			01 Prehistoric times	
			02 Middle ages	
			03 Modern times	

No.	*Subject*	*Swedish Abbreviation*	*Subdivisions*	*Notes*
23	Household equipment	Ht		Exclusively teaching aids designed for the subject. See also Hk
24	Health and care of the sick	Hos	00 General	
			01 Anatomy	
			02 Anaesthesiology	
			03 Personnel management and administration	
			04 Occupational therapy	
			05 Audiology and audiometry	
			06 Biochemistry	
			07 Pharmacology	
			08 Photography	
			09 Physiology	
			10 Military and emergency medical services	
			11 Geriatrics	
			12 Gynaecology	
			13 Histology	
			14 Hygiene	
			15 Health and care of the sick	
			16 Infectious diseases	
			17 Intensive care	
			18 Surgery	
			19 Clinical chemistry	
			20 Laboratory technique	
			21 Internal medicine	
			22 Microbiology	
			23 Obstetrics	
			24 Surgical nursing	
			25 Pathology	
			26 Pediatrics	
			27 Psychiatry	
			28 Psychology for nursing professions	
			29 Radiotherapy	
			30 Rehabilitation	
			31 Radiography	
			32 Kinesiatrics	
			33 Care of the sick (see 15)	
			34 Dentistry	
			35 Occupational employment - introduction	
25	Italian	It		

No.	*Subject*	*Swedish Abbreviation*	*Subdivisions*	*Notes*
26	Chemistry	Ke	00 General 01 Chemical apparatus 02 Biochemistry 03 Physical chemistry 04 Inorganic chemistry 05 Organic chemistry 06 Chemical engineering	
27	History of art and music	Kmu		Exclusively teaching aids for the entire subject. See also Te and Mu
28	Consumer information	Kk		Exclusively teaching aids designed for the subject. See also Hk
29	Office work	Kot	00 General 01 Calculating machines 02 Typing 03 Practical secretarial work 04 Stenography	
	Religion	See Re		
30	Latin	La		
31	Mathematics	Ma		
32	Mechanical engineering	Mt	00 General 01 Energy 02 Construction M 03 Production M	Automatic control M, see Reg
33	Music	Mu	00 General 01 Ear training 02 Knowledge of music 03 Listening to music 04 Song, playing, movement 05 Voice culture	
34	Nature lore	Nk		Exclusively teaching aids designed for the subject under M and G. See also Ge, Bi, Fy, Ke
35	Norwegian	Nor		
36	General subjects	Oä		Exclusively teaching aids designed for Oä under M. See also Bi, Ge, Hi, Na, Sk, Re

No.	*Subject*	*Swedish Abbreviation*	*Subdivisions*	*Notes*
37	Pedagogics	Ped		
38	Portuguese	Po		
39	Production engineering	Prod	00 General 01 Work study 02 Work planning	
40	Psychology	Ps		
41	Automatic control	Reg		
42	Comparative religion	Re	00 General 01 Biblical knowledge 02 Non-Christian religions 03 History of Christianity 04 Churches and religious communities 05 Faith and views on religion and philosophy	
43	Russian	Ry		
44	Civics	Sk	00 General 01 Vocational orientation and choice of vocation 02 Home, family, school 03 International questions 04 Formation of public opinion 05 Organisations 06 Society, community planning 07 National economy, private economy 08 Constitutional practice, politics	Geographical sections in G and F, see Ge
45	Arts and crafts	Sl	00 General 01 Metal handicrafts 02 Textile handicrafts 03 Wood handicrafts	
46	Sociology	Soc		Exclusively teaching aids specially designed for Soc. See also Sk
47	Social medicine	Sm		Exclusively teaching aids designed for Sm. See also Hos
48	Spanish	Sp		

No.	*Subject*	*Swedish Abbreviation*	*Subdivisions*	*Notes*
49	Knowledge of languages, general	Aspr		Exclusively teaching aids designed for Aspr. See also the various languages.
50	Swedish	Sv		
51	Drawing	Te	00 General 01 Knowledge of art 02 Script 03 Drawing, painting 04 Engineering drawing 05 Three-dimensional work	
	Technical orientation	See To		
52	Technology	To		Exclusively teaching aids for the entire subject. See also Fy, Ke, Te
53	Traffic theory	Tr		
54	German	Ty		

DOCUMENTATION OF EDUCATION IN THE UNITED KINGDOM WITH AN ACCOUNT OF OTHER SEMI-MECHANISED AND MECHANISED SYSTEMS OF INTEREST

by *D J Foskett* and *M J Humby*

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1. INTRODUCTION

Automated documentation systems are likely to evolve from existing services, if only for economic reasons; we therefore begin with a brief survey of the current position in educational documentation in the United Kingdom. We then go on to consider some current research projects into various aspects of information needs and provision in the social sciences and education. Next an account is given of semi-mechanised and mechanised systems already in use: those operating in education and the social sciences are described first, then relevant examples from medicine and the natural sciences are given. The concluding section analyses the problems involved in developing adequate automated systems and makes some proposals for possible solutions.

2. EXISTING DOCUMENTATION SERVICES

The most systematic attempt to document the literature of education has been made by the librarians of Institutes and Schools of Education, who have initiated a number of useful co-operative schemes. A union catalogue of books in Institute and School of Education libraries is maintained at the University of Birmingham School of Education Library. The catalogue is in sheaf form and records about 85,000 titles and editions of titles, listed under main author only. At present 72% of requests made are satisfied; in the session 1967-68 a total of 2,485 requests was received. The catalogue is also used by the National Central Library to trace educational titles for which it has no location. A union list of the periodical holdings of Institutes and Schools of Education is also compiled; further information about this is given below under the heading 'Semi-mechanised services'. The most widely used service is the *British Education Index*, a subject and author guide to articles on education and allied subjects appearing in more than eighty British periodicals, most of which are not indexed in the Wilson *Education Index*. Although published by the Library Association, the work of compilation is undertaken by the staffs of the Institute and School of Education libraries, each library being responsible for indexing certain specified periodicals. The compilers submit entries on 5 x 3 inch cards to the Editor (at present the Librarian of the University of Leeds Institute of Education). The Editor inserts cross references and sends the cards to the British National Bibliography Production Unit in London, where the entries are typed by Varityper on 80 column cards, each card bearing one line of matter only. The cards are passed through a Fotolist camera, which produces a negative of the material in columns ready to be turned into pages. Finally, the material on the negatives is transferred to a litho plate from which copies are printed by offset lithography. This production method inevitably imposes some limitations on the speed of publication of the index; it is hoped that experience gained from the use of computer typesetting techniques for the *British Technology Index* may alleviate this problem. (For further information about the production of the *British Technology Index* see below under the heading 'Other mechanised services of interest'). Other co-operative schemes operated by these libraries include a union list of books and textbooks of historical value (published by the Library Association under the title *Sources for the history of education*); co-operative storage of obsolescent textbooks and acquisition of materials on education overseas; and publication of union lists of pamphlets of the Board of Education and of books on education in France and Germany.

A variety of other organisations attempt to document the particular aspects of education with which they are concerned. The British Association for Commercial and Industrial Education (BACIE) publishes as an inset supplement in its quarterly *Journal* a bibliography of the important books, pamphlets, reports and articles relevant to its field which have appeared in the previous three months. These supplements are published later in bound volumes with a subject index as *The BACIE bibliography*.

The Department of Employment and Productivity compiles an *Industrial training research register* and issues the *Training Abstracts Service*, the latter taking the form of a series of cards issued in monthly batches, each card containing one abstract and a suggested classification symbol taken from the Department's own scheme. The abstracts cover books, articles and research reports on all aspects of industrial training.

The National Institute of Adult Education has published *A select bibliography of adult education in Great Britain,* which includes references to books, articles and theses. It is updated by annual lists published in the Institute's *Year Book.*

Two complementary organisations are at work in the field of languages. The British Council's English Teaching Information Centre (ETIC) deals with the teaching of English as a second or foreign language, while the Centre for Information on Language Teaching (CILT), which is maintained by the Department of Education and Science, the Scottish Education Department and the Northern Ireland Ministry of Education, deals with the teaching of modern languages. The two bodies collaborate in compiling *Language-teaching abstracts,* published quarterly by Cambridge U.P., and have edited a *Language-teaching bibliography,* also published by Cambridge U.P. A register of current research relevant to the interests of both organisations is maintained in the Language-Teaching Library which is run jointly by them.

The Society for Research into Higher Education publishes a quarterly journal entitled *Research into higher education abstracts,* which includes some books in addition to periodical articles, arranged in a rather broad classified order. Research projects in higher education are listed in its *Register of research into higher education,* issued in loose leaf form and supplemented or completely revised at intervals.

The Physical Education Association of Great Britain and Northern Ireland publishes a quarterly bibliography of articles and a separate quarterly bibliography of books dealing with physical and health education, sport and allied subjects. Abstracts of selected periodical articles are published ten times per year. The possibility of microcarding and pooling each of these annually is at present under consideration.

Some documentation services are produced to cover specific forms of materials rather than particular subjects: periodicals, theses and audio-visual aids each have their own special tools. In addition to the British Education Index and the abstracting services already mentioned above, the following abstract journals are published:

Geographical Abstracts. Published six times per year in four separate series: geomorphology, biogeography and climatology, economic geography, social geography and cartography.

Sociology of Education Abstracts. Sponsored by the University of Liverpool School of Education and now edited at Oxford. Published quarterly. A research project based on this service is described below under the heading 'Current research projects'.

Technical Education Abstracts. Published quarterly by the National Foundation for Educational Research. Covers technical and further education and training for industry, commerce and agriculture at all levels.

Theses in the field of education have been documented by the National Foundation for Educational Research through its lists of *Current researches in education and educational psychology,* which continue the *List of researches in education and educational psychology* and its supplements compiled by Mrs. Blackwell. The list of *Current researches* is at present out of date (the latest ends in 1963), but there are plans to produce an annual list of current researches from 1968/9 onwards and to publish a cumulated list of completed research for the period 1963-68, to be extended later to cover the period 1961-69 or 1961-70. It is also possible that Blackwell's lists of completed research will be brought up to 1960 and cumulated into one volume. The Scottish Council for Research in Education lists researches in education and educational psychology presented for degrees in Scottish universities in its annual report. Research in progress in fields related to education is recorded in *Scientific Research in British Universities and Colleges,* volume III, Social sciences, compiled by the Department of Education and Science and the British Council and published by

H.M. Stationery Office. The Social Science Research Council publishes a list of *Research supported by the SSRC* and this includes some educational projects.

The national organisation for audio-visual aids is made up of the National Committee for Audio-visual Aids in Education (NCAVAE) and the Educational Foundation for Visual Aids. The latter is responsible for cataloguing classroom films and filmstrips and publishes a catalogue entitled *Visual aids: films and filmstrips* in eight parts, each dealing with a group of related subjects. The two bodies publish jointly *A survey of British research in audio-visual aids*, which covers books, articles and theses, with abstracts of the more important work, and a *Catalogue of recorded sound for education*. Several other organisations provide partial documentation of audio-visual aids, including the British Council *(Catalogue of tape recordings)*, the British Film Institute *(Film extract catalogue)*, the Scottish Central Film Library *(Visual aids produced by Educational Films of Scotland)*, the Association for Programmed Learning *(Programmes in print)*, and the British Universities Film Council *(Films for universities)*. The Government-sponsored National Council for Educational Technology was set up in 1967 to co-ordinate the application of educational technology in education, government, the armed forces and industry. It has initiated two research projects on documentation problems related to audio-visual aids and these are described in the next section.

3. CURRENT RESEARCH PROJECTS

An essential foundation for planning future documentation services is a knowledge of users' needs. In December 1966 the Office for Scientific and Technical Information (OSTI) announced the award of a grant to Mr. M. B. Line, Bath University of Technology to enable him to study the information needs of the social sciences. (This has become known as INFROSS.) A preliminary report of the investigation was presented to OSTI in April 1968 and an article based on this report appeared in the *Journal of Librarianship*, vol. 1 no. 1, January 1969, pp. 1-19. The article presents an analysis of the factors to be investigated and outlines possible methods of investigation. Among the questions to be considered is to what extent the use of computers is necessary or desirable; though their contribution is expected to be considerable, it is felt that there may be difficulties over such matters as the handling of concepts by computer. Associated with this are such questions as to what extent the user should be trained to use a system, or whether a personal intermediary between the system and the user is likely to be desirable or necessary. If the study shows that browsing or accidental discovery is an important way of finding information, should provision for some kind of browsing at secondhand through the system be made when the use of computer-stored information systems prevents direct access to large collections of books?

The main investigation has now begun. This takes the form of a mail questionnaire sent to 2,500 social science researchers and follow-up interviews of some respondents and non-respondents. A small number of individuals will be intensively studied over a continuous period in an attempt to ascertain their day-to-day information habits and requirements. It is hoped that these methods will enable a much clearer picture to be drawn of the information needs of social scientists.

Sociology of Education Abstracts

In 1968 OSTI awarded a grant to the Editor of *Sociology of Education Abstracts* to enable him to investigate the possibility of improving the system of arrangement and indexing at present in use. SEA was designed primarily as a current awareness service provided by subject specialists for subject specialists. About forty-five sociologists from the U.K. and abroad survey about 225 journals published throughout the world and a books editor selects newly published books for abstracting. SEA users are believed to be fairly representative of the whole spectrum of information users in the social sciences, ranging from practitioners to those engaged in highly specialised research. By 1968 the 'amateur' phase in which academic organisers attempted to manage the service was felt to be no longer viable in face of the volume of material, the rapid development of sociology and the conceptual conflicts in dealing with two disciplines. A preliminary survey of the problems was carried out by a small working party which found no previous research into dissemination problems specifically in the field of sociology of education. The present investigation was then planned.

The research will be carried out in two stages. Stage one will involve studying present and potential users to find out their preferences as to coverage in general and of individual abstracts, physical form of presentation and subject arrangement. The uses to which SEA is put (current awareness, retrospective searching, or special research interests) will also be studied. Alternative presentations of the material contained in an issue or part-volume of SEA will then be produced to test users' reactions. Questionnaires and interviews will be used for data collection. The aim of this stage will be to relate preferences to characteristics of users, thus indicating the direction of future developments in the light of potential markets.

The second stage will be devoted to the design and development of a system for SEA based on the information about needs and preferences elicited in stage one. This stage will include a study of the possibility of mechanisation of at least some operations and of linkage with other services, such as *Sociological Abstracts* and *Educational Administration Abstracts*. The potential value for SEA of various existing classification schemes will be investigated. D. J. Foskett's London Education Classification and Barbara Kyle's scheme for social science literature will both be studied from this point of view. Consideration will also be given to the use of post-coordinate indexing systems. It is hoped that publication of the improved SEA will begin in 1971.

National Council for Educational Technology (NCET)

The Steering Group of the NCET's Advanced Project in Educational Technology has produced a policy document which recommends that public support should be given to a programme for applying computer systems in education. It suggests that development work should be begun immediately on the application of computer-based learning in certain well-defined and critical parts of the education system, including applications in the field of educational planning such as the storage and retrieval of data on individual children by teachers. Development work on terminals for use by individuals needing direct access to computers is also recommended. Clearly, much of this development work will be of benefit to information retrieval in general: if teachers can retrieve information from a computer about an individual child, it may be possible to store bibliographical references of interest to teachers in the same computer. At any rate, some means of linking information services to such a computer could probably be worked out.

Two other research projects initiated by the NCET are already in progress. The first relates to a proposal put forward in 1968 for a *multi-media catalogue*, which would do for film strips, sound recordings, wall charts etc. what the British National Film Catalogue does for films and the British National Bibliography for books. A grant was awarded by OSTI for a feasibility study to be carried out under the direction of Mr. Bernard Chibnall, Head of Media Services, University of Sussex Centre for Educational Technology. A Research Fellow was appointed to carry out the investigation and submit a report.

The objectives of the study were defined as follows:

- To identify the various media to be catalogued and the information needed about each type.

- To consider the principles of a classification system and cataloguing procedure which would most effectively display the information required, taking into account the main existing national and international systems.

- To consider, in conjunction with the British National Bibliography, how the information might best be disseminated.

- To outline the organisation necessary to collect, process and disseminate the information and prepare estimates of cost.

- To list distributors of materials from whom information would be sought and with whom contact would need to be maintained.

The plan of work adopted by the Research Fellow included a study of whether the computer systems being evolved by the BNB Project MARC (described later in this report) were capable of adaptation to a multi-media catalogue.

An interim report by the Research Fellow was submitted in December 1968. This dealt primarily with his investigations into users' needs, his work in compiling a list of distributors of materials, and his despatch of a questionnaire to the members of the Colleges of Technology and Further Education sub-section of the Library Association. At the end of the report mention was made of the potential services which could be provided in conjunction with Project MARC: specialised subject catalogues, catalogues arranged according to type of media, or catalogues of the output of any one producer (or of some or all producers). These possibilities will be discussed in greater detail in the final report of the project, which is due to be submitted later this year.

The other NCET research project relates to an *educational technology abstracting service*. In April 1968 a meeting was held to discuss the need for a centralised bibliographic and abstract service in educational technology. It was attended by individuals from the University of Sussex Centre for Academic Services (now the Centre for Educational Technology), the Ministry of Labour Training Department, the University of London Institute of Education Library, the Office for Scientific and Technical Information, the National Foundation for Educational Research, and the National Council for Educational Technology. It was agreed that there appeared to be a need for a selective published abstract service covering the more significant material, backed by a fully comprehensive central index of titles, directed primarily at teaching institutions across the whole range of education and training. It would be limited at first to British periodicals.

After considering the possibilities of enlarging one of the existing abstract services which already dealt with educational technology in part, it was decided that it would be necessary to set up an independent unit, preferably based in an appropriate educational institution and having close links with the existing services.

Before attempting to set up the unit a more intensive study of the volume of need was found to be necessary. It was therefore decided that a list should be compiled of all the journals currently scanned by relevant abstracting and indexing agencies and an estimate made of the volume of material relevant to educational technology which was not covered by these sources. The Librarian of the University of London Institute of Education agreed to undertake this survey. The report of this survey confirmed the need for an abstracting service and made some suggestions as to its possible form. These included the use of a classified scheme of arrangement, bearing in mind the fact that such schemes lend themselves readily to computerisation.

University of London Institute of Education Library

We give here a brief description of the information services at the London Institute of Education Library, which may be considered as typical of what the research worker or practitioner might expect to find from a good library at the present time. Similar services are given at the other Institutes, but as London is by far the biggest, with the most staff, its extent and coverage is probably wider than any of the others.

For books, a monthly mimeographed list of new accessions is circulated to all academic staff and to many other libraries in the U.K. and abroad. This is compiled from duplicates of the slips used for ordering, after they have been edited by the cataloguing staff. The list is arranged first into sections corresponding to the major departments of the Library, and then in the order of their classification schemes; it therefore constitutes a classified bibliography, and since the scope of the London Institute is so wide, the list covers all the background subjects to Education (in varying depth, according to the level at which the subject is studied at the Institute).

There are three services based on periodicals.

(i) A monthly mimeographed list *Selected articles of interest* is circulated to the same recipients as the Accessions List. These articles are selected by the Librarian and the Periodicals Librarian from the current periodicals, on the basis that they should be of wide general interest to the staff of the Institute, and may well come from non-educational periodicals such as *Nature,* which frequently has an important and influential editorial on some aspect of education, particularly science education. This list normally includes any articles written by London Institute staff themselves.

(ii) For the specialist, a *Current Contents* service consists of a copy of the contents pages of current periodical issues in the field of his speciality. Each Department of the Institute has been invited to name a dozen periodicals which are central to its work, and these are copied for it as they arrive. This serves two functions: it notifies specialists of the titles of new articles in their fields, and it also informs them that these articles have arrived in the Library.

(iii) As is well known, articles on one special subject are quite likely to appear in peridicals normally devoted to another. The editorials in *Nature* are examples. In documentation, this is known as "Bradford's Law of Scattering". It would be impossible for the specialist to scan every issue of every periodical that might conceivably contain something of interest, but this is by no means impossible for the librarian, who is scanning the current issues for other purposes, such as book selection, as well. A postcard service has been established, to draw the attention of specialists to these "scattered" articles. As with the monthly list, the scanning is done by the Librarian and the Periodicals Librarian in the main, but library departmental heads also assist on the basis of their own subject interests. Academic staff are invited to register their fields of interest - their "profiles" - with the Library, and they receive cards that are judged to be relevant. This is not an evaluating service, and there is no doubt that some of the cards cite articles that are rubbish; but most, if not all, academics, prefer to make their own judgements. The pattern of use of this service varies widely, but it is generally agreed to be one of the most valuable given by the Library. Copies of the articles are provided if the recipients need them for their research.

As this card may be of interest, its layout is given below:

UNIVERSITY OF LONDON
INSTITUTE OF EDUCATION LIBRARY

The following journal has just been received in the Library and contains an article which may be of interest to you:

Journal -

Issue -

Author -

Subject -

Please bring this card with you to the Library.

4. SEMI-MECHANISED SERVICES

There are two semi-mechanised services relevant to education. The University of London Institute of Education Library has published its *Catalogue of periodicals in the library*, 1968, which was compiled with the help of the British National Bibliography production unit. Individual entries were typed on to 80 column tabulating cards, followed by the punching of various codes. These were: an alphabetical sequence, a country sequence, re-ordering and binding code. The cards were then automatically sorted into order and a negative using a Foto-list sequential camera was prepared into an offset litho plate. A country index was formed by resorting the cards into the sequence code and similarly photographed for the final print-out. The cards are kept in alphabetical order of title so that the file can easily be updated with new titles. Revised lists can thus be easily produced.

The second service is the *British National Bibliography (BNB)* itself. This records the current British output of books and pamphlets relating to education and allied subjects along with those on all other subjects. BNB is published weekly and has cumulated monthly indexes and cumulations of both entries and indexes at intervals of three, six and nine months, one and five years. The arrangement of the entries is in accordance with a modified version of the Dewey Decimal Classification, so that books on education appear in section 370-379. But there are several other sections which are also relevant to education (e.g. 136.7 - Psychology of children, 301 - Sociology). A Foto-list camera is also used in the preparation of the entries in BNB for offset printing. A fully mechanised service is provided by the use of MARC tapes prepared by BNB; this service is described in the next section.

5. MECHANISED SERVICES IN EDUCATION

In 1968 Oriel Press published the *Union list of periodicals held in Institute of Education libraries as at 31 July 1968*, edited by J. M. Smethurst. This edition was the first to be produced by means of computer typesetting programs developed by the Newcastle computer typesetting project. The programs used were: input, for reading the data and transferring it to magnetic tape; output program to provide a printout for checking the file; an editing program for correcting and amending the file (this permits a printout of all amended records so that printed supplements to the original list can be produced); and production programs for transferring the magnetic tape record on to the printed page. The text was produced by a 'Monophoto' machine, which permits the use of italics and bold type. One disadvantage of the Monophoto page output is that entries are sometimes split at the foot of a page, so it is necessary to edit the output before printing (e.g. by transferring entries from the bottom of a page to the top of the next, or adding continuation notes). This inevitably increases production time and cost. It is hoped that new machinery will solve this problem and speed up the typesetting process.

The production of a union list by no means exhausts the potentialities of the equipment and software at Newcastle. It is possible to produce from the data already recorded lists of the holdings of individual Institutes, or lists showing the longest holdings of individual titles. Future possibilities include listings according to the indexing or abstracting journals dealing with the periodicals, date of first publication, language and country of origin, name of the society sponsoring the periodical, or subject. Data could also be included which would enable the system to produce printouts informing individual libraries when subscriptions were due for renewal or when a complete volume should be ready for binding. A union list of the holdings of the colleges of education within an Institute's area could be included as a subsidiary list within the file.

For details of the system reference may be made to:

Dews, J. D. and Smethurst, J. M. *The Institutes of Education union list of periodicals processing system.* Oriel Press, 1969. (Symplegades no. 1.) SBN 85362 060 1.

Current Literature Bulletin

An experiment which included the literature of education took place during the autumn 1968 sitting of Parliament. This was a current awareness service sponsored by the Office for Scientific and Technical Information and based on material selected and indexed by the House of Commons library. The product was a series of lists, each covering a specific topic (e.g. Education, Social Problems), giving references to books, pamphlets, periodical and newspaper articles and Parliamentary proceedings. The material for the lists was processed by means of computer programs developed by the U.K. Atomic Energy Authority's Culham Laboratories for an information service in plasma physics.

Two cumulations of the *Current Literature Bulletin* have been prepared. Certain of the individual subject groups (including education) were themselves cumulated, and in addition a cumulation of all entries in one alphabetical list of subject headings was issued under the title *Experimental Parliamentary index, session 1968-69:* cumulation for period 30th October to 20th December 1968. In this list, some material for earlier years was included under three headings (Consumer protection, Nuclear power, Parliamentary Commissioner) in order to give some idea of the potential for retrospective searching. Unfortunately, detailed subject headings could only be provided for one of these subjects (Nuclear power), owing to lack of time.

One difficulty acknowledged by the compilers was that the number of indexing terms was limited to 300 for the whole of British domestic affairs. This inevitably meant that the subject matter of education was not well arranged, but doubtless improvements could be made if the system were put into operation on a permanent basis. The experiment did not in fact demonstrate the full potential of the computer programs, for the facility of producing a name/word index to the entries was not used.

The Office for Scientific and Technical Information is to assess users' opinions of the lists in order to assist in planning the future development of social science information services.

Further information about this experiment is available in the following article:-

Poole, J. B. *Information services for the Commons: a computer experiment.* Parliamentary Affairs, vol. XXII, no. 2, spring 1969, pp. 161-9.

The British National Bibliography

The *British National Bibliography* is playing an increasingly important part in the documentation scene in the U.K. It is a weekly bibliography of all the British (and some American) books published and deposited in the British Museum under the copyright law. It is extensively used in education libraries, both for the selection of current material, and as a retrospective searching tool for answering enquiries. The London Institute of Education Library co-operates with the *BNB* by sending to it such publications as it receives which do not, for one reason or another, get into the British Museum. These are usually the smaller pamphlets published by societies, etc., that is, the type of organisation which is important for education but which is not a publisher in the usual sense of a commercial operation. The *BNB* issues cumulations of the weekly parts at regular intervals, and also sells catalogue cards which may be purchased as required.

The BNB does not cover periodical literature, except that it gives an entry for new periodicals on the date of their first appearance. It must be considered important, however, for its nearly complete coverage of books and pamphlets, both in Education and in all the related fields, such as Psychology, Sociology, Social Welfare, Philosophy, etc.

Its major importance at present, however, is that it represents an organisation in the process of conversion from a partly-mechanised system to a computer-based system. The BNB volumes are at present produced from negatives produced in a Fotolist camera, and reproduced by offset lithography. Entries are typed on to punched cards on Varityper typewriters, with upper and lower case characters, bold and italic typefaces. The cards are passed through a sequential scanning camera, which produces a roll of paper "negative" from which the offset plates are run by a professional printer. This process has been used to publish the London Institute of Education Library's Catalogue of periodicals, and is notable because it allows for very easy up-dating of a file of entries, and therefore for reasonably cheap revision and cumulation.

The BNB is also the collaborating body in the U.K. for the Library of Congress MARC Project (Machine Readable Catalogue). Magnetic tapes are exchanged each week with the Library of Congress, so that the BNB now has tapes of all new American publications, as well as British. The British tapes are being distributed to a group of university and public libraries, so that they may devise and test systems for using the tapes for the recording of their own new accessions.

At the BNB, new books are first catalogued according to the 1967 Anglo-American Cataloguing Code, and classified by the Dewey Decimal Classification and the Library of Congress Classification. Entries are then typed into machine-readable form on a tape typewriter, which produces a human-readable text, in MARC format, for checking, and at the same time a punched paper tape which can be read into the computer. At present, the BNB has no computer of its own, but uses a commercial agency operating an ICT machine.

A certain amount of checking is done by the computer, but a printout of the week's intake is provided to the BNB for human checking as well. Any corrections are read into the tape, and the final version produced and duplicated for supply to the co-operating libraries. When this has been done, each week's intake is also added to the cumulating tape, which now contains a complete and up-to-date record and can be used for printing the cumulations.

Tags are added to authors' names, joint-authors, corporate authors, added entries for series, etc. One of the biggest problems facing the BNB now is that of subject indexing. It has been found that the standard BNB procedure of "chain indexing" from the schedules of the classification scheme is becoming increasingly unable to meet the demands of the modern complex subjects of documentation, while linked to the schedules of the Dewey Decimal Classification. The Head of Research and Development at BNB, R. E. Coward, has said that there is a pressing need for a new classification scheme covering the whole of knowledge. BNB subject cataloguing staff themselves are developing techniques for the assignment of subject index headings ("descriptors") which will accurately describe their documents for the purposes of information retrieval. This technique is derived from the work of the British Classification Research Group (as in the London Education Classification).

This project would appear to offer the greatest hope for use by individual centres of data provided by a bibliographical centre. Most of the technical problems of compilation appear to have been solved, and the main difficulty for the individual library or documentation centre is that of extracting from the main central record, which may contain a deal of unwanted material, only those entries which are actually added to its own stock. Mr. Coward thinks that it should be possible to devise a system whereby some tag attached to each entry could be described by the library, and run through the computer together with the tape, so that the printout would include only those entries whose tags had been noted. This might be done, for example, by typing the Standard Book Number on a tape typewriter, running both tapes into the computer, and instructing it to print out only those books which are identified, from the printed weekly BNB, with their Standard Book Number. For subject identification, of course, this tagging would have to be a classification symbol, which makes it even more pressing that a satisfactory scheme should be developed as quickly as possible.

As stated above, the BNB/MARC Project deals only with books and other monographs. For the documentation of periodical literature, it would be necessary to set up a more specialised service, perhaps along the lines of the INSPEC system of the

Institution of Electrical Engineers, or the MEDLARS from the U.S. National Library of Medicine, also operated in the U.K. by the National Lending Library for Science and Technology in collaboration with the University of Newcastle, or the Chemical Abstracts Service system operated in the U.K. by a research unit of the Chemical Society at the University of Nottingham. All of these systems will be briefly described later in this Report.

6. OTHER MECHANISED SERVICES OF INTEREST

Commonwealth Agricultural Bureaux

The Commonwealth Agricultural Bureaux form a group of documentation centres set up by the U.K. in collaboration with the governments of Commonwealth countries. They have been operating information services and publishing a range of abstracts journals for many years, and Aslib has begun a study of the possibility of mechanising the production of the journals and the operation of the information and enquiry services. OSTI and the CAB are also participating, with the Federal Republic of Germany and the U.S.A., in an international mechanised abstracting service, the "Food science and technology abstracts" produced by the International Food Information Service.

INSPEC

The development of the Information Service in Physics, Electrotechnology and Control, has been carried out mainly by the Institution of Electrical Engineers, with support from OSTI. The first part of the project was to examine the possibility, both technical and economic, of producing the IEE publications by computer. These are "Science Abstracts", and "Current Papers". When this had been satisfactorily carried out, research was continued on the provision of other services notably the Selective Dissemination of Information system, also computerised, which had been begun on an experimental basis by the former National Electronics Research Council.

By the middle of 1967, the ICT 1901 computer at the IEE was being used to prove a suite of programs from which could be produced not only the range of IEE publications, but also a data bank suitable for processing on a larger computer. Programs had already been proved for composing printed text into lines and galleys, and for writing magnetic tape instructions for driving a Lumitype 713 filmsetter. Trial parts of Science Abstracts were successfully run on the filmsetter, with the object of beginning full-scale production from the beginning of 1969. The file structure and the computer programs have been planned along lines which will enable alterations and modifications to be made reasonably easily if practical experience proves them to be necessary. Since the publications require a set of nearly 700 pieces of type, a special keyboard has been designed to overcome the problems of typing, proof-reading and printing.

The IEE intends to continue the investigation in order that these facilities may be used to provide the fullest possible range of user services. The SDI service consists of the registration of "profiles" of their information needs by a group of practising engineers who have agreed to collaborate in the tests. These profiles are coded and fed into the computer and matched at regular intervals with the document data that is being fed in from the recording programs. Hits are registered and printed out on cards which are despatched to the users, who are invited to comment on the usefulness or otherwise of the original document. An element of "serendipity", or unspecified chance result, has been built into the system, so that users regularly receive items that do not come within their regular profile, but have some chance relation to it. Reports indicate that these items are being found of considerable interest, which seems to prove that, when a computer-based service of this kind is being installed, one should not lose sight of the fact that much useful information is regularly gathered by specialists from unexpected sources, or when and where they did not search along specific lines. In other words, the "browsing" function of a library or document store has value which may be in danger of being overlooked when a computer program for information retrieval or SDI is being planned. It is of interest to note that this point is emphasised by F. W. Lancaster, who has very considerable experience with the

MEDLARS system, in his new book, *Information Retrieval Systems* (Wiley, 1968).

Another part of the current research consists of an evaluation of alternative index languages to find the one most suitable for the whole range of INSPEC activities.

The whole INSPEC operation is a good example of national and international co-operation. The IEE now co-operates with the Institute of Physics, the Physical Society, and the American Institute of Physics. Further collaboration is developing with the American Institute of Electrical and Electronic Engineers, which has been associated for some time with the IEE in the second part of Science Abstracts, the "Electrical and Electronic Abstracts". The AIEEE will provide abstracts of American material which can be included on the magnetic tape produced for the ICT 1901 computer, and so integrated into the other material produced for Science Abstracts.

The Chemical Society Research Unit in Information Dissemination and Retrieval

This unit is based at the University of Nottingham, and is of interest because it makes use of magnetic tapes provided by the American Chemical Society. Its aims are:

(i) to introduce U.K. chemists to computer-based information retrieval services, and to discover the problems associated with running such services;

(ii) to measure the users' reaction to the new form of retrieval;

(iii) to compare these services with more conventional ones.

The computer used is a KDF 9, and a selected group of collaborators has been both sending in questions to be searched, and receiving a Selective Dissemination of Information service from current journals. A *Search Manual* was published in 1967 which gives guidance to users on what services are available, and on how to formulate requests for mechanised searching. The research was supported by OSTI, but it is hoped that it will be put on a Cost-Recovery basis as quickly as feasible.

Output since the beginning of 1968 has been on 6 x 4 inch cards with tear-off tags, on which are included the "search terms present" to guide users to the correct search strategy. A new printing program introduced in 1968 also contains a facility for printing "no hits" cards for profiles which fail to receive any output. This means that all users receive at least one card from every run, and are not left wondering what has happened if it should chance that their profile does not get a match in any search period.

Most of the profile and search formulation difficulties derive from the field of chemistry itself, but it is significant that the search and profile construction procedures make use of what the Director of the project calls "expansion of concepts", a technique closely similar to the facet analysis of Ranganathan, as used in the London Education Classification, and for searching in the multi-entry subject catalogue used in the University of London Institute of Education Library.

Information Retrieval Group of the Museums Association

This Group is supporting a research project on the cataloguing of museum objects at the Sedgwick Museum, Cambridge. The object is to meet the needs of inter-disciplinary searching by the use of automatic data processing, and it is hoped that the work will provide not only a research tool (its major objective), but also facilities for the control of collections and for museum management. At present, the scheme is limited to geological data, and four museums are collaborating. One universal problem that has received particular attention is that of compatibility between systems, and the team has collaborated with the British National Bibliography and the work done on the preparation and use of the tapes of the MARC Project of the Library of Congress/BNB. The obvious solution of agreement of the storage format to be used for all museum data was considered impossible, and the alternative of providing a satisfactory method of communicating between different systems adopted. A "Communication Format" has been designed which enumerates in great detail all the possible features of museum objects, and each system wishing to participate in sending or receiving data must agree to use this format. It is of interest to note that the Imperial War Museum is one of the principal collaborators, although not a geological museum. It was found that the actual storage and retrieval problems of the two classes of objects were very similar, and that the same communication format could be used. The intention of the team now is to continue their analysis of input data structure so that it could be extended to all fields of knowledge. In other words, they are looking for fundamental categories of terms rather than merely enumerating the terms that are specific to one particular field.

British Technology Index

The first application of computer assistance to the production of BTI came with the use of programs prepared by the University of Newcastle upon Tyne Computing Laboratory to generate inversion cross references from input headings, to extract from store synonym and relational cross references, to sort, and to produce a printout authority file. All programs were for the English Electric KDF 9 computer. The next stage, not yet implemented, will make use of computer typesetting techniques for the production of BTI itself. The delay in implementation is due to the lack of a filmsetter which will accept magnetic tape straight from the computer and match the production time of the present method employed by BTI. It is hoped that this stage may come into operation in 1969 if the Linotron 505 setter is found to be suitable. Success in applying these computer programs to BTI is clearly of interest in connection with the mechanisation of the *British Education Index*, which shares the same publisher as BTI.

MEDLARS

The experiment with the Medical Literature Analysis and Retrieval System of the U.S. National Library of Medicine started in 1967 under an arrangement made with OECD countries, beginning with the U.K. and Sweden. The U.K. is indexing British journals for input to the tapes, and supplying this free of charge in exchange for the complete tapes. U.K. MEDLARS activities are centred at the University of Newcastle and the National Lending Library for Science and Technology, and experience so far proves beyond doubt that the best use comes from those places, like Newcastle, where there is qualified liaison staff to assist users to make the most of the service.

The original aim to complete most searches in less than ten working days was not fully realised, owing to shortage of computer time, but this position was improved during 1968 when the Documentation Processing Centre, Manchester, developed a second processing facility, using the University of Salford KDF 9 computer. Liaison officers have been appointed at the Royal Society of Medicine, London, and the universities of Edinburgh and Manchester, in addition to those at Newcastle and the NLLST. Some 250 articles from 62 journals are being indexed each week, and it is expected that this figure will rise to 300-350 articles from the 200 British publications covered by MEDLARS itself already. A member of the staff of the NLLST was sent to Washington to be trained in their indexing techniques, and since his return, he has trained other members of NLLST staff; and the NLLST has also held a course on the use of MEDLARS for librarians, information officers and medical research workers. Seminars have been held at several places by the liaison officers.

OSTI has awarded a research grant to the Computing Laboratory of the University of Newcastle, for a three-year programme on on-line search formulation and indexing for MEDLARS. This will provide tapes of both the MEDLARS entries and the Medical Subject Headings list used for indexing, so that the user will be able to compare and test the results of searches using different keywords.

During 1969, more services will be developed. In particular, attention will be paid to current awareness projects in the chemical-biological field as well as the medical. Again liaison officers have been appointed, and the work is being co-ordinated by an Experimental Information Unit at the University of Oxford.

7. PROBLEMS AND PROPOSALS

Perhaps the most important thing that needs to be said at this stage is the absolute necessity for collaboration between all the interested parties, on the national and international scales. Over the years there have grown up in many countries efforts of differing sizes, more or less unco-ordinated, often using similar systems, but sometimes totally incompatible. Even among the international organisations themselves, one cannot always be sure that they are fully aware of each other's doings, and further difficulties are created by the varying modes in which countries may participate in the work of the international organisations. Some have central documentation services, which simplifies collaboration; but many, including the U.K. do not.

The increasing awareness of the importance of efficient systems for storing and disseminating information, together with the advent of effective computer-based schemes that are already operational in other disciplines, particularly in science and technology, make it all the more important that documentation in Education should be subject to some form of co-ordination and control. We certainly cannot afford to see the growth of many small, separate schemes, no doubt offering the unfortunate spectacle of much duplication coupled with incomplete coverage of the field. It must be recognised that (i) computer systems are the only possible solution in the face of the vast increases in research and publication in recent years; (ii) computer systems are very expensive, and must therefore be operated on the largest possible scale to be economical; (iii) the wealthy and technologically advanced countries have a responsibility towards the developing nations; (iv) only by international co-operation can the valuable work published in less-used languages be made known to other countries who could profit by it.

All these factors, and many others, point to the need for some supra-national organisation, such as the International Committee on Social Sciences Documentation or the International Council for Scientific Unions, which could enlist the help of member organisations. It may be that this might best be carried out through the Council of Europe, but it must be pointed out that the Continent of Europe has no special significance as an educational unit, and the Council itself does not, in fact, include all of the Continent of Europe. This would not be a drawback provided that the Council of Europe were able to enlist the co-operation of other national or supra-national bodies. Such an international central body would have to establish recognised national centres through which it could both collect and disseminate information. Experience in other fields has proved that recognised channels of communication are essential; this applies not only to the communications between national and international centres, but also within each country. If the results of comprehensive documentation are to be exploited to the full, local liaison officers are also needed to act as a link between the system and its ultimate users - the teachers and administrators themselves.

There is a great deal to be learnt from the example of the ERIC scheme of the U.S. Office of Education, which is now interested in widening the scope to include Europe. It is vitally important that we should not be misled by the scheme's undoubted potential value into accepting it as it stands at present, because whatever may be the position in the U.S., the plain fact is that in other countries the products of ERIC are considered to have very serious drawbacks. In our view, it would be inappropriate for Europe to enter into this scheme at the moment, though we should naturally welcome every opportunity to collaborate on a properly effective basis.

In the first place, the ERIC scheme is organisationally suited to a large country in which centres of research are widely scattered, though a small country like the U.K. may in the event prefer to organise its coverage of research documentation by establishing several separate units each dealing with a particular subject (in the manner, for example, of the Commonwealth Agricultural Bureaux), but this course should certainly not be adopted without a good deal of preliminary investigation. We should not be in favour of a European scheme in which each country had the responsibility for a particular subject. It seems certain that each of the participating countries should look after the documentation produced by itself, covering all subjects, at least in the first instance. Later, it may well be that centres of research in particular areas may develop on a supra-national basis, but we do not consider that this is the correct way to begin co-operation in documentation

The overall organisational pattern of ERIC can offer useful lessons. Its experience in administering a scheme based on a number of collaborating centres will undoubtedly prove of value, and we can also profit on the computer side. In the U.K., similar experience in the field of chemistry and chemical industry has led to the formation of the Consortium on Chemical Information (COCI), which aims to draw together all the individual efforts in its field, with the object of enabling information from one part of the field to become readily available to all the others, as well as making all the schemes more economical to operate. Experience such as this indicates that there should be no difficulty in working out the appropriate institutional forms, once the aims and objectives are agreed on.

One of the biggest handicaps to more widespread use of ERIC is undoubtedly the inadequacy of the Thesaurus of Educational Terms and the system of indexing. No European scheme for documentation could possibly use this thesaurus and be satisfactory. It can be criticised on several grounds: lose terminology, inconsistent application of subject headings, varying treatment of comparable headings in sub-dividing (e.g. Physics and Chemistry), lack of necessary and even commonplace headings and references. The new edition, lately published, shows some improvements, but still suffers from some fundamental defects, which cannot be overcome merely by adding new terms.

Another thesaurus has been produced by Case Western Reserve University. This has been constructed by the team originally engaged by the U.S. Office of Education to prepare its own thesaurus; but the two groups parted company at some stage, and consequently there are now two American thesauruses. The CWRU effort is much superior, has a clearly defined structure, and avoids most of the faults mentioned above. We would not recommend that this be used as it stands, however, mainly on the grounds that it has been prepared from examination of American literature, and lacks many terms and aspects found elsewhere. It did make some use of the London Education Classification, and has a faceted structure, which is very well suited to computer indexing. This thesaurus and the LEC, therefore, could well serve as the basis for an elaborated list of indexing terms, a controlled vocabulary, suitable for the automatic indexing and printout of bibliographies, abstracts, etc., for European documentation systems. One of the immediate tasks, from the point of view of international compatibility, is to draw up a thesaurus or classification scheme of terms, coupled with an international glossary of meanings.

Another drawback to the present output of ERIC is the complete lack of any criteria of selection. So far, the abstracts do not cover the published literature, but only research reports which are fed into the various subject centres. It appears that all of these are then included, regardless of the status of the report, its originality, or the significance of the work reported. One can find many examples of commonplace and trivial investigations which are not worth calling "research", and would certainly not be regarded as such in the U.K. The question of selection and evaluation is, of course, a delicate one. We would not wish to claim that a documentalist should automatically have the right to judge whether or not a particular report should be included in an abstract journal, but it is clear from experience with the ERIC Research in Education that some criteria need to be set up so as to exclude the trivial, and prevent it bulking out the abstracts unnecessarily. Not only does this add considerably to the costs, and use computer time wastefully, but it is also very discouraging to the users if they find over and over again that the reports that they have traced and acquired with a good deal of labour turn out to be of little or no value. It must be emphasised that, with limited resources, every effort should be made to use them to the best advantage.

The fact is that there is a strong tendency, perhaps understandable, for the originators of a documentation service, whether abstracts, indexes, bibliographies, or some other form, to regard the size of their output as the main criterion for measuring its value. This is a case where the notion of "productivity" is somewhat misplaced. In documentation, more does not necessarily mean better. On the contrary, it is much more likely to mean worse, in terms of value to the user. This does not constitute quite such a menace in respect of published material, which has normally been put through a process of "refereeing" even if only by the editor of a journal, or a publisher's reader. These people may not always be expert in the field, but they are nevertheless working to a recognised standard. In the case of some of the "research" included in ERIC, there is no such standard apparent.

The avoidance of waste, therefore, should be a prime concern. We maintain that, just as the object of documentation is to serve the individual user, so the evaluation of input should be judged according to standards drawn up in the light of what will be useful. It is important, of course, that such evaluation should be seen to be just, and this probably means that evaluation should not be left to a centre that may be remote from the originator of the report. This points to the absolute necessity for enlisting the collaboration of as many individual workers as possible, so that judgements may be made by those in the field, who are actually in contact with, and aware of, the problems that a report purports to solve. From the point of view of using the system, U.K. experience with the MEDLARS and Chemical Society computerised indexing and searching systems shows beyond doubt that the system is worked to the best advantage when the individual user is able to approach it through the Liaison Officers who have been appointed to local centres. These conduct a dialogue with the user to clarify his need and interpret it in terms of the system, and they also help in evaluating the output from the computer when this turns out to be in large quantities, as is often the case. Where no Liaison Officer has been appointed, our experience is that users who begin to use the system with enthusiasm, as most do, tend to become disillusioned fairly quickly if they find that the results they receive are disappointing; usually this means that they receive far too many references because they have not been able to achieve a proper match between the terms of their request and the terms of the index. This may be due on occasion to faults in the index language, or it may be due to the user's lack of ability to use the index language correctly.

None of these problems is insuperable, and indeed solutions to most of them are already available, at least in principle. The nature of an ideal system is fairly clear; its establishment will, in our view, depend more on social, psychological and political, rather than on technical, factors.

The problems may be summarised thus:

(i) Coverage: includes questions of selection, evaluation;
countries, languages;
subjects, disciplines;
types of document.

(ii) Input: includes questions of index language, thesaurus;
computers, equipment;
types of staff used.

(iii) Output: includes questions of indexes, abstracts;
magnetic tapes, printed volumes;
centres for dissemination.

(iv) Follow-up: includes questions of provision of hard copy, microforms;
translations;
retrospective search facilities;
training in use, courses.

(v) Organisation and administration: includes questions of
international, national, regional centres:
co-ordination of existing services;
training, exchange of staff;
governing body.

(i) *Coverage*

As far as the U.K. is concerned, coverage is reasonable in respect of the indexing of British, American, and some other published literature, including several European countries. What is needed is more abstracting, in English; this means extension both by country and by subject, since not all English and very little American published literature is yet covered by abstracts. The ideal at this stage would be a centre which covered all the world's literature, and which was able to draw on a wide range of literature, since much of educational significance appears in non-educational publications.

(ii) *Input*

Both indexing and abstracting services (British Education Index, Technical Education Abstracts, Sociology of Education Abstracts) enjoy the collaboration of numbers of librarians and subject specialists. Their contributions are edited centrally, although all contributors are supposed to use standard formats. This would probably by the most effective procedure to adopt for an international centre as well. If input were greatly increased, as it needs to be, at least in respect of abstracts, more contributors would be needed. Even at present, the BEI is seeking to enlarge its coverage of British journals, as well as being faced with several that have only just begun publication. It would be very desirable to try to enlist the help of practising teachers, as well as research workers; this would give them a sense of participation in the enterprise, and demonstrate that the needs of practitioners, rather than the ambitions of producers, were paramount.

A study is needed of the various lists of terms now being used by these systems, and their relation to users' needs on the international scale, with a view to establishing a truly international thesaurus or classification scheme.

Questions of compatibility between diferent ranges of computer equipment must be studied; in this connection, the experience of existing systems such as that of Euratom would be valuable.

(iii) *Output*

Two main types of output seem to be establishing themselves in the sciences: an index which appears very soon after publication, such as Chemical Titles and British Technology Index; and informative abstracts which are necessarily subject to rather more delay since they contain more information and therefore need more processing. It is claimed that computer processing speeds up the appearance of indexes, but it must be remembered that, where large numbers of contributors are involved, the speed of publication is not entirely in the hands of the editors. It is doubtful whether the BEI, in its present form, could fill the role of a "fast-title" service for immediate current awareness; but this would be a useful addition to the bibliographical apparatus.

For abstracts, the principal need is for an extended coverage of journals and reports, and more integration of the existing services. Probably the main difficulty here is an organisational one: who would undertake the task? In the absence of a recognised national documentation centre for education, the field is now open for any organisation or even individual to begin a project of his own, and even, as with Sociology of Education Abstracts, to obtain financial backing from government sources.

No Selective Dissemination of Information system exists, apart from that at the London Institute of Education, and any other similar private system that may exist; but these systems are unknown outside their own walls, and do not contribute significantly to the national effort, except in so far as their results appear in published bibliographies or the citations to published articles by those who receive them.

The U.K. certainly needs access to a translation service, particularly from less-used but important languages, such as those of Eastern Europe. Some English-language abstracts already exist for some of these journals, but the coverage is far from complete, and it is hard to obtain translations of the full texts.

So far, few educational centres are equipped to handle computer tapes; but with the growth of the BNB/MARC Project, it is likely that this position will improve. In our view, however, there is likely to remain for a long time at least, a real need for printed catalogues and bibliographies at the local level, where the individual user gains access to a system. Any international centre will have to offer printed output if it is to become widely used. This output might be generally in book form; but the role of cards will need to be considered, not only for an SDI service, but also for local centres to build up their own cumulating card file, as with the Occupational Safety and Health Abstracts issued by the Centre International de Sécurité, in the International Labour Office in Geneva.

(iv) *Follow-up*

Follow-up in the U.K. is at present virtually dependent on personal goodwill, in that all that exists relies on inter-library lending. The Institutes of Education scheme is well established, as is the national scheme based on the National Central Library, and there is an increasing tendency for libraries to supply photocopies rather than originals; this is less work, cheaper to post and can be sold to the borowing library to add to its own stock. The National Lending Library for Science and Technology has now included Education, but its stock is still small; it lends books and journals, and can now supply microfiches of ERIC reports.

One of the chief gaps is provision for retrospective searching on a national basis. All Education libraries receive enquiries from outside their own organisations, but such a service is not officially part of their duties, and depends on goodwill. Similarly, little provision for training of users exists apart from lectures and seminars given by librarians to their own users. The NLLST has arranged courses of several days duration in fields of science, and in the Social Sciences in general, but has not, so far , arranged a course for users of the literature of Education.

(v) *Organisation and administration*

Since most of the development of educational documentation in the U.K. has been of a "voluntary co-operation" kind, there exists very little in the way of a national centre for organisation and financing of participation in an international scheme. It is doubtful whether the Department of Education and Science would take it on, under present circumstances. However, there has recently been created a Libraries and Information Services Branch within DES, which includes both OSTI and the Library Advisers group, which formerly were in two different branches of DES. It may be that this new Branch will undertake the same "sponsoring" role in respect of non-scientific subjects as it has undertaken already in respect of the sciences; for this reason we have included descriptions of some of these activities in this Report. In any case, we feel that this new Branch should certainly be the main point of contact with an international system. The only other serious contender is the National Foundation for Educational Research, which has an honourable record in documentation, but which has always been handicapped by lack of funds, and might prefer to play the part of a beneficiary, rather than the organiser, of a national documentation of education service. It would, of course, clearly be necessary to secure the goodwill and co-operation of the NFER, in any kind of venture.

Much the most important part in the U.K. has been played by the librarians of the Institutes of Education, whose various schemes have already been described. They have provided very useful services, including the BEI itself, on a minimum of funds and with a minimum of staff; but the point has nearly been reached when some assistance is required if their effort is to continue to play the same part. They have ensured a high standard of operation, and would certainly wish to continue to exercise this influence in the future. They would therefore make the most suitable points of contact, or interface, between the users and the producers of a system. If they were relieved of some of the labour of their present services, for example the publishing side of the BEI or the arrangement of inter-library lending, it would be possible for them to further develop their contacts with the teachers; most Institutes have good relations with practising teachers already, but all would agree that these could be extended if there were an improved documentation service to offer. Institute librarians would also be most suitable to act as Liaison Officers for their areas, to channel requests from users back to the centre.

Most U.K. librarians now receive an extensive professional training, and in the syllabus of the Library Association there is provision for the study of the Bibliography and Librarianship of Education. General training of staff is therefore probably not necessary. Some Institutes of Education arrange meetings and seminars, for College of Education staff for example, but further specialised training would be required if an international system were set up. We are strongly of the opinion that Training, for both users and staff, ought to be of prime concern for such a centre, and suggest that early consideration be given to the formation of a Research and Training Wing. This would ensure, not only that the use of the centre's output was always in the hands of experts, but also that the operations of the centre itself were constantly under review in the light of rapidly advancing technology and constantly developing requirements on the part of the users.

EDUCATIONAL DOCUMENTATION AND INFORMATION SYSTEMS AND NETWORKS IN THE USA

by *K Spangenberg*

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At present two different developments might have to be distinguished in the field of educational documentation and information in the United States: 1. the establishment of systems for the analysis, compression, and organisation of literature and of information on materials, and 2. the development of physical and organisational networks with the capacity eventually to integrate all kinds of systems for the analysis, compression, and organisation of literature and of information on materials including those in the field of education. These two developments are treated in Section 1 and Section 2 respectively.

I. EDUCATIONAL DOCUMENTATION AND INFORMATION SYSTEMS

A great number of specialised documentation and information activities can be observed today in the United States. For purposes of this report only three have been selected: the Educational Resources Information Center project (ERIC), the School Research Information Service (SRIS), and the Education Products Information Exchange (EPIE). All three of them have broad subject scopes and attempt to be nation-wide services. Furthermore, both SRIS and EPIE profit by the existence of ERIC: SRIS having co-operative arrangements with ERIC and using its thesaurus, and EPIE using the body of research information gathered and analysed by the ERIC system.

ERIC

ERIC (formerly: *Educational Research Information Center*; since 1967: *Educational Resources Information Center*) was created in May 1964 as an operation of the US Office of Education to "augment present information exchange methods and to increase the value of research simply by letting people read it, absorb it, and apply it in new settings". (1)

Since 1956 the amount allocated to educational research in the budget of the US Office of Education had increased from $2 million to about $200 million annually. Consequently the number of important research papers that many educators should have the chance to read had increased extraordinarily, too.

That there would be little chance for anyone beyond a very limited group of researchers to obtain, read, and evaluate research reports for innovation projects, was one reason for organising a special programme of dissemination "to speed all research results to places where they are needed and when they are needed". (2) Another reason was the need to try to incorporate in a nation-wide information system those research and development activities not sponsored by the US Office of Education.

Thus by the end of 1968 a network of 19 ERIC clearinghouses co-operating with Central ERIC at the USOE (US Office of Education) came into existence. Their specialist fields and addresses are:

Adult Education
Syracuse University
Syracuse, New York 13210

Counseling and Personnel Services
University of Michigan
Ann Arbor, Michigan 48104

Disadvantaged
Teachers College
Columbia University
New York, New York 10027

Early Childhood Education
University of Illinois
Urbana, Illinois 61801

Educational Administration
University of Oregon
Eugene, Oregon 97403

Educational Facilities
University of Wisconsin
Madison, Wisconsin 53703

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(1) BURCHINAL, L.G., Director, Division of Research Training and Dissemination, US Office of Education "ERIC ... and the need to know". Washington: US Office of Education 1966.

(2) BURCHINAL, L.G. and HASWELL, H.A. "How to put two and a half tons of research into one handy little box". Reprint from: *American Education*, February 1966, p.3.

Educational Media and Technology
Institute for Communication Research
Stanford University
Stanford, California 94305

Exceptional Children
Council for Exceptional Children
Washington, D.C. 20036

Higher Education
George Washington University
Washington, D.C. 20006

Junior Colleges
University of California at Los Angeles
Los Angeles, California 90024

Library and Information Sciences
University of Minnesota
Minneapolis, Minnesota 55404

Linguistics
Center for Applied Linguistics
Washington, D.C. 20036

Reading
Indiana University
Bloomington, Indiana 47401

Rural Education and Small Schools
New Mexico State University
Las Cruces, New Mexico 88001

Science Education
The Ohio State University
Columbus, Ohio 43221

Teacher Education
American Association of Colleges for
Teacher Education
Washington, D.C. 20036

Teaching of English
National Council of Teachers of English
Champaign, Illinois 61820

Teaching of Foreign Languages
Modern Language Association of America
New York, New York 10011

Vocational and Technical Education
The Ohio State University
Columbus, Ohio 43212

Each of the 19 ERIC clearinghouses in universities and other institutions is responsible for information in the indicated area of education. On the basis of contracts with Central ERIC the staffs of specialists in the clearinghouses acquire, select, abstract, and index all relevant documents. Central ERIC co-ordinates the clearinghouses, stores the full texts of documents, announces all new acquisitions, and makes the documents available at nominal cost in hard copies or in microfiche form. (3) For the physical dissemination of microfiches and hard copies the network has another agency: The ERIC Document Reproduction Service (EDRS). EDRS operates on an Office of Education contract initially with the Bell and Howell Company, Cleveland, Ohio, but since 1968 with the National Cash Register Co., 4936 Fairmont Avenue, Bethesda, Maryland 20014. All requests for microfiches and hard copies must be sent to and will be handled by the ERIC Document Reproduction Service. (4)

Users of ERIC are kept informed monthly by *Research in Education* (5), which includes data on reports received from research projects funded by the USOE as well as other reports collected by the clearinghouses. This catalogue also includes information about current projects supported through the Bureau of Research, USOE. Consequently the catalogue contains two major parts: 1. the Document Section with information on completed research projects and other selected documents, and 2. the Project Section with information on current projects. Each section consists of document and/or project résumés (not exceeding 250 words per résumé), subject index, author index, and institution index. A third section contains cross-references to accession numbers of ERIC clearinghouses and Central ERIC. The indexes are cumulated and published separately every six months.

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(3) cf. BURCHINAL, L.G. op. cit., and BURCHINAL, L.G. and HASWELL, H.A. op. cit.

(4) In 1968 3,550,000 reports in microfiche and 33,000 reports in hard copy were sold.

(5) *Research in Education. A Monthly Abstract Journal.* Washington, D.C.: US Department of Health, Education, and Welfare. 1966 ff. By June 1969 *Research in Education* registered 4,250 paid subscriptions. Over 1,000 further copies are distributed free to State Libraries and other institutions.

For a decentralised system like ERIC, with storage and retrieval of data done by a computer through Central ERIC, the development of standards, their observance by the clearinghouses as well as quality control of their output became essential. As all clearinghouses are contractors of Central ERIC (USOE) the standards to be observed are written into the contract.

According to the 1966 contract forms, contractors agree to locate significant current research and research related materials including unpublished documents, reports, papers and other communications and establish "a surveillance network among recognized scholars in their subject field". (6) Book material normally acquired by libraries is not to be processed into the ERIC system.

In co-operation with ERIC, Crowell, Collier and Macmillan, through its Information Science subsidiary, started publishing the *Current Index to Journals in Education* (CIJE) with a double issue Nos.1 and 2, 1969 in June 1969 providing indexing to 1,811 articles for the period January and February 1969. (7)

In drawing upon the expertise of the ERIC clearinghouses and the vocabulary of descriptor headings developed for the *Thesaurus of ERIC Descriptors* (8) and on the basis of a selection among more than 600 journals by a panel, CIJE currently covers 216 journals in the field of education with an additional 50 journals, annuals, and yearbooks to be indexed this autumn (1969). CIJE's coverage of peripheral literature "assures access to important articles published in those periodicals which fall outside the scope of education-oriented literature". (9)

All articles listed in CIJE are indexed by one of the 19 ERIC clearinghouses or by Central ERIC. CIJE is compiled by means of computer manipulation of the data received. Typesetting is accomplished by photocomposition. (10)

Figures 1 and 2 show sample entries from *Research in Education* and from the *Current Index to Journals in Education*.

Indexing for both *Research in Education* and for the *Current Index to Journals in Education* has to conform to guidelines developed by a Panel on Education Terminology. The Panel states: "The development of an educational research information system is an enormous undertaking. The key to the storing, searching and retrieving of information is an indexing vocabulary ...". The clearinghouses have to agree in their contracts to assist in building and improving an educational thesaurus. (11)

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(6) cf. p.5 of *Attachment A to Contract*.

(7) cf. *ERIC User Notes, Occasional Letter* No.2 (June 1969), p.1.

(8) Thesaurus of ERIC-Descriptors: Phase I. US Department of Health, Education, and Welfare. Washington: June 1966.

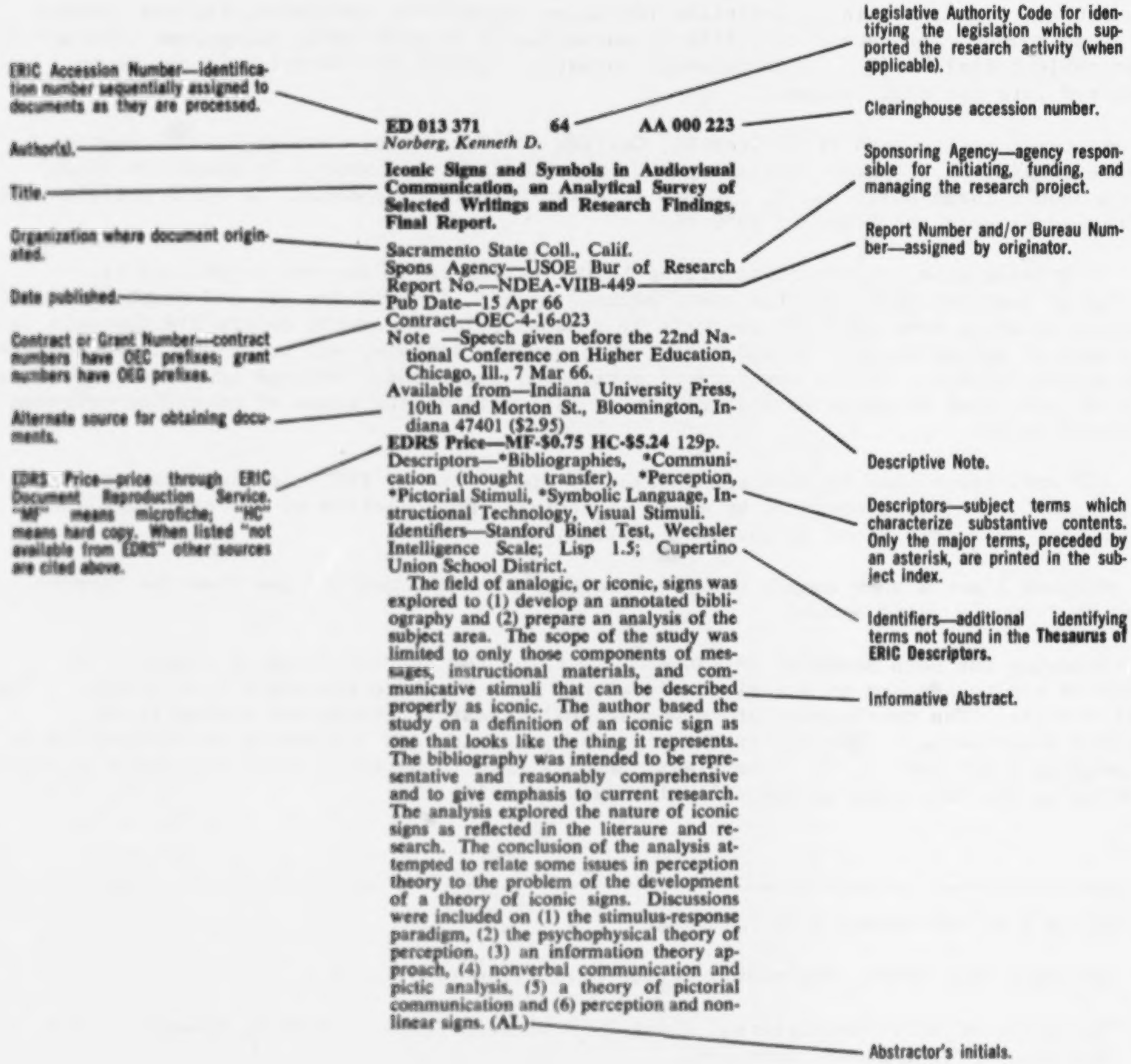
Thesaurus of ERIC-Descriptors (2nd Ed.). US Department of Health, Education, and Welfare. Washington: April 1969.

(9) *Current Index to Journals in Education*, Vol.1, No.1-2 (January-February 1969), p.5.

(10) cf. ibid, p.5.

(11) See footnote (8).

Fig. 1. Sample entry from *Research in Education*



ERIC Accession Number—identification number sequentially assigned to documents as they are processed.

Author(s).

Title.

Organization where document originated.

Date published.

Contract or Grant Number—contract numbers have OEC prefixes; grant numbers have OEG prefixes.

Alternate source for obtaining documents.

EDRS Price—price through ERIC Document Reproduction Service. "MF" means microfiche; "HC" means hard copy. When listed "not available from EDRS" other sources are cited above.

ED 013 371 **64** **AA 000 223**
Norberg, Kenneth D.

Iconic Signs and Symbols in Audiovisual Communication, an Analytical Survey of Selected Writings and Research Findings, Final Report.

Sacramento State Coll., Calif.
Spons Agency—USOE Bur of Research
Report No.—NDEA-VIIB-449
Pub Date—15 Apr 66
Contract—OEC-4-16-023
Note —Speech given before the 22nd National Conference on Higher Education, Chicago, Ill., 7 Mar 66.
Available from—Indiana University Press, 10th and Morton St., Bloomington, Indiana 47401 ($2.95)
EDRS Price—MF-$0.75 HC-$5.24 129p.
Descriptors—*Bibliographies, *Communication (thought transfer), *Perception, *Pictorial Stimuli, *Symbolic Language, Instructional Technology, Visual Stimuli.
Identifiers—Stanford Binet Test, Wechsler Intelligence Scale; Lisp 1.5; Cupertino Union School District.

The field of analogic, or iconic, signs was explored to (1) develop an annotated bibliography and (2) prepare an analysis of the subject area. The scope of the study was limited to only those components of messages, instructional materials, and communicative stimuli that can be described properly as iconic. The author based the study on a definition of an iconic sign as one that looks like the thing it represents. The bibliography was intended to be representative and reasonably comprehensive and to give emphasis to current research. The analysis explored the nature of iconic signs as reflected in the literaure and research. The conclusion of the analysis attempted to relate some issues in perception theory to the problem of the development of a theory of iconic signs. Discussions were included on (1) the stimulus-response paradigm, (2) the psychophysical theory of perception, (3) an information theory approach, (4) nonverbal communication and pictic analysis, (5) a theory of pictorial communication and (6) perception and nonlinear signs. (AL)

Legislative Authority Code for identifying the legislation which supported the research activity (when applicable).

Clearinghouse accession number.

Sponsoring Agency—agency responsible for initiating, funding, and managing the research project.

Report Number and/or Bureau Number—assigned by originator.

Descriptive Note.

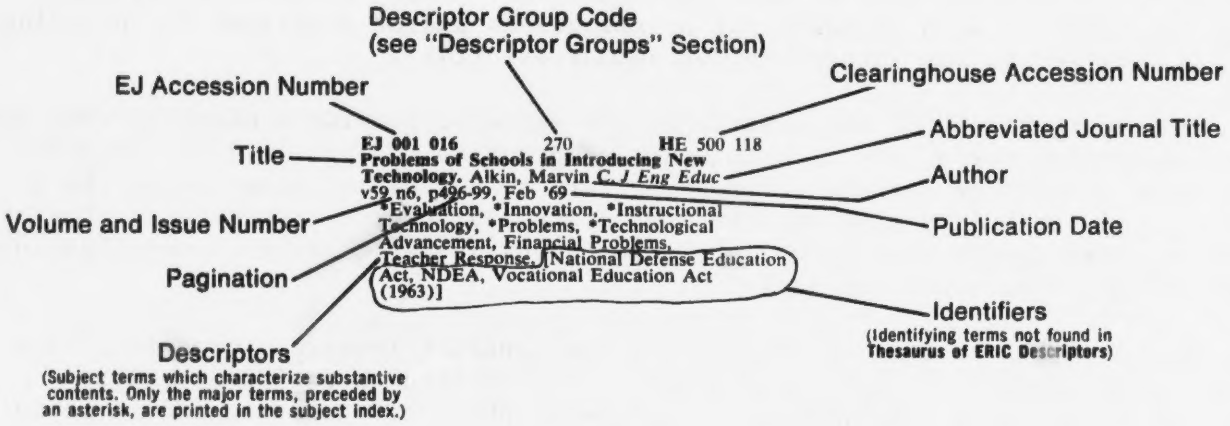
Descriptors—subject terms which characterize substantive contents. Only the major terms, preceded by an asterisk, are printed in the subject index.

Identifiers—additional identifying terms not found in the **Thesaurus of ERIC Descriptors.**

Informative Abstract.

Abstractor's initials.

Fig. 2. Sample entry from *Current Index to Journals in Education*


Descriptor Group Code
(see "Descriptor Groups" Section)
Clearinghouse Accession Number
EJ Accession Number
Abbreviated Journal Title
Title
Author
Volume and Issue Number
Publication Date
Pagination
Identifiers
(Identifying terms not found in Thesaurus of ERIC Descriptors)
Descriptors
(Subject terms which characterize substantive contents. Only the major terms, preceded by an asterisk, are printed in the subject index.)
EJ 001 016 270 HE 500 118
Problems of Schools in Introducing New Technology. Alkin, Marvin C. J Eng Educ
v59 n6, p496-99, Feb '69
*Evaluation, *Innovation, *Instructional Technology, *Problems, *Technological Advancement, Financial Problems, Teacher Response, [National Defense Education Act, NDEA, Vocational Education Act (1963)]

For *Research in Education* the original copy of each ERIC Document Résumé accompanied by sets of tabulating cards or by tape containing the citations and index terms for each item has to be sent to Central ERIC. Central ERIC reviews the résumés of documents selected by the clearinghouses for indexing and abstracting consistency and during the initial period of the contract also requests those résumés not intended by the clearinghouse for national distribution.

To give a rough estimate on the selection of research papers and related documents obtained by an ERIC clearinghouse, of every 3,000 examined 1,000 are not acceptable. They may be only of local interest, their methodology may be poor or their descriptive material too superficial. A further 1,000 documents fall into a different category, being worthwhile for people in certain specialised areas but not nationally significant. These would be documents to be kept by the specialised clearinghouse rather than being included in Central ERIC storage and publications. The remaining 1,000 will be included in the central system. (12)

As regards inquiries Central ERIC will only answer general inquiries preferably by "packaged-type responses" on the analysis of incoming requests thus freeing the subject field specialists' time to answer more difficult reference questions. From January to June 1968 ERIC clearinghouses received 11,631 inquiries and Central ERIC about 2,400 letters (400 per month). (13)

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(12) "In Fiscal Year 1968, ERIC collected over 35,000 documents. Of these about 10,000 were discarded because they were duplicates of those already in the system, did not add significant new information, were not relevant to education or were of poor quality. 13,000 were retained for use in the collections of individual ERIC clearinghouses. 12,000 were programmed for input in *Research in Education* to be made available through the ERIC Document Reproduction Service" (*ERIC User Notes, Occasional Letter* No.2, p.2).

(13) cf. BURCHINAL, L.G. "Evaluation of ERIC, June 1968". US Department of Health, Education, and Welfare. Office of Education, Bureau of Research, October 1968.

Practically all clearinghouses issue newsletters or brochures with announcements about ERIC products, information on bibliographies, reviews etc. By June 1968 over 160 major bibliographies and over 50 major interpretative reviews of research findings and results had been produced and/or disseminated by the clearinghouses. Most clearinghouses have established arrangements with professional organisations and/or magazines for printing and disseminating newsletters and interpretative summaries. (14)

When contracting with USOE the clearinghouses agree to provide a means to test and evaluate the effectiveness of the clearinghouse's operation. This includes detailed search question records as well as records of indexing term or descriptor usage as an aid to finding an optimum vocabulary size and the most economical search procedures. Furthermore information on costs should also be collected for a cost-benefit study of the clearinghouse's operations to be conducted later.

As to the personnel of each clearinghouse, the contract requires three full-time professional staff members or their equivalent. The individual assigned primary responsibility for managing the information retrieval phase of operation should be full-time. The professional staff should have three additional persons for clerical assistance. (15)

The criteria governing decisions on new contractors (16) are of particular interest in so far as many of them might be also used for similar decentralised systems to secure certain standards and quality of work. They contain items on administrative and technical qualifications as well as on the assessment of the contractor's standing in the field and reactions of other organisations with similar subject specialisation.

Details on the ERIC project can be found in a 47-page evaluation up to June 1968. (17) Its further developments including on-line experiments for interrogating ERIC files can be followed in the Occasional Letters of the ERIC User Notes.

In concluding this short survey on ERIC it may be said that the products of this decentralised system are not limited to the dissemination of data on and abstracts of documents but include the documents themselves, so that the ERIC collection can be made the nucleus of an information agency on educational research and development or may be an addition to existing centres anywhere in the United States and where this information is needed in other countries.

SRIS (18)

SRIS (*School Research Information Service*) is an agency of Phi Delta Kappa, International, for storage, retrieval, and dissemination of reports on educational research and innovative practices. The project started in July 1966. SRIS tries to secure copies of school research reports and descriptions of innovative practices both directly from the schools and school study councils and through the membership of Phi Delta Kappa.

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(14) cf. ibid, p.23 and 24.

(15) These arrangements were made prior to the publication of the *Current Index to Journals in Education* and only hold for manpower required in clearinghouses for their share in *Research in Education* as well as for other clearinghouse activities.

(16) These are detailed in the Appendix to this paper.

(17) BURCHINAL, L.G. "Evaluation of ERIC, June 1968".

(18) cf. *SRIS Quarterly* vol.1, nos.1 and 2 (1967/1968).

SRIS uses the ERIC thesaurus and has a co-operative arrangement with ERIC. Reports dealing with a topic for which an ERIC clearinghouse exists are forwarded to that centre. On the other hand SRIS focuses on subjects for which there is no ERIC clearinghouse. As well as this difference in subject field, SRIS differs from ERIC in its restriction to a particular target group, elementary and secondary schools and their improvement of practices. "For instance, a report which might not interest a researcher in higher education could prove to be enormously helpful to a classroom teacher." (19)

SRIS specialises in serving inquirers by searching for documents in a particular subject area in both the ERIC and the SRIS files. The inquirer is then sent the microfiches of SRIS documents and the numbers of relevant ERIC materials which he could order from the ERIC Document Reproduction Service.

EPIE (20)

EPIE (*Education Products Information Exchange*) began its independent operations as a non-governmental, non-industry, and non-profit organisation in August 1967. EPIE's programme is based on four assumptions:

" - A product that works well in one educational setting with one set of students will not necessarily work as well or be suitable elsewhere.

- School decision-makers would be helped significantly by easily accessible product profiles composed of a producer's description of his product, an analysis of the product by independent researchers, and a summary of reports from an appropriate sampling of users who have had experience with the product in specific instructional settings.

- The availability and use of such product profiles can improve local curriculum decisions and purchasing practices.

- The widespread co-operation of educators in contributing to and using such product information could also assist professionals in industry who are responsible for improving existing products and creating new ones." (21)

EPIE tries to "improve the quality of educational technology by building a nationwide system for exchanging descriptive and evaluative product data among all sectors of the educational community on a co-operative cost-sharing basis" and to "stimulate educators in schools and industry to contribute to and use this base of data as a regular part of their professional work". (22)

At present EPIE offers its services in the form of a monthly publication, *The EPIE Forum*. Under a three-year plan (1968-1970) EPIE intends to add analytical information to the present producer information contained in *The EPIE Forum* as well as feedback from users and to handle inquiries with the help of electronic data processing equipment and other communication devices.

For classification purposes EPIE uses the ERIC thesaurus.

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(19) "SRIS vis-à-vis ERIC". In: *SRIS Quarterly*, Spring 1968.

(20) cf. "A brief description of the purpose and program of the Educational Products Information Exchange Institute". March 1968, and "Improving the 'National System': EPIE's Three-Year Plan".

(21) "A brief description ... ", p.1.

(22) Ibid., p.1.

II. EDUNET - AN EDUCATIONAL NETWORK IN HIGHER EDUCATION

The above-mentioned projects ERIC, SRIS, EPIE and similar ones in non-educational fields are each designed to analyse, compress, and organise literature and information on materials in one particular area. There is, however, a more comprehensive type of network being developed in the United States and in Canada, EDUNET, with capacity eventually to provide for the integration of all kinds of systems for the analysis, compression, and organisation of literature and materials in various areas.

The Interuniversity Communications Council EDUCOM was founded in 1964 with two general objects:

- to disseminate information about new technologies in the communications sciences and their adaptation, and
- to achieve the ends which the member universities of EDUCOM cannot accomplish individually by the establishment of task forces.

The council is open to universities in the USA, Canada and Mexico. By September 1968 93 universities and colleges (six of them Canadian) holding about two thirds of the student population of both the United States and Canada had joined EDUCOM. The Interuniversity Communications Council tries to follow its objectives by means of its bulletin, *EDUCOM*, issued six times annually, several conferences, and common projects.

More specifically one of the primary objectives of EDUCOM is the establishment of a network among the member universities. J. Baruch distinguished for this purpose three categories of network: (23)

- a natural network as "a pictorial expression of various desires and resources" among a group of co-operating universities,
- a physical network as a "structure or assemblage of parts capable of conveying some subset of the resources" of the natural network,
- an organisational network not necessarily following the lines of either the natural or the physical network, being "basically concerned with the flow of network meta-information", i.e. "billing, cost accounting, instructions, standards, performance data and data concerning the shape of the networks themselves".

Baruch holds that EDUCOM will have its greatest immediate impact in the organisational network "where it can lay the groundwork that may make the difference between failure and success of future physical networks".

As regards the problems of developing information networks among universities and colleges, EDUCOM's Task Force on Information Networks held a Summer Study at the University of Colorado at Boulder indentifying details and recommending the establishment of an EDUNET in three phases. (24) In a survey report on EDUCOM and its objectives J.G. Miller gave eight reasons for the need for EDUNET. (25)

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(23) cf. BARUCH, J. "Thoughts on Taking Office". In: *EDUCOM*, vol.3 (1968), no.2, p.4 and 5.

(24) cf. BROWN, G.W., MILLER, J.G. and KEENAN, T.A. (Eds.) "EDUNET. Report of the Summer Study on Information Networks Conducted by the Interuniversity Communications Council (EDUCOM)." New York etc.: John Wiley & Sons, Inc. 1967.

(25) cf. MILLER, J.G. "Potentialities of a Multi-Media, Inter-University Educational Network". In: de REUCK, A. and KNIGHT, Julie "Communication in Science: Documentation and Automation. A Ciba Foundation Volume." London: J. & A. Churchill Ltd. 1967, p.236-242.

- *Sharing of Resources:* According to Miller it is "less expensive and more efficient for a group of colleges and universities to share common educational facilities than for each institution to buy or lease its own". This goes both for libraries and for teachers. If, for example, at the University of California, all the students and faculty members were to have the access to libraries of the students at Berkeley, the Berkeley library would need to be duplicated about six times, which would cost about $250,000,000 for the present nine campuses. "This sum would pay for storing electronically a large fraction of the bibliographic citations, abstracts and full texts in the entire published literature, which could thus be retrieved at any terminal throughout the network."

  As regards the shortage of teachers, universities could share "the human resources of faculty members" through the preparation of instructional material, television lectures and live 'tele-conferences', enabling professors to be freed from rote lecturing and to meet small groups of students.

- *Equalising Access to Information:* As it would cost too much to correct the disparity between library facilities of larger institutions and small institutions a network "could provide a more uniform dissemination of information throughout the country".

- *Accelerating Information Processing:* Though J.G. Miller admits that we "do not yet fully understand (the network's) problems or its potentials" he believes, however, "that it would save students and scholars much time and accelerate scholarship throughout the academic world".

  Through rapid access to information, studies might be made attractive "that are not attractive now because they would require too much time". When citations, abstracts and full texts can be obtained in two or three minutes at remote terminals this would result in changes in scholarly behaviour. On-demand access to taped television programmes will make educational television a more important means of teaching and learning. A network might furthermore decrease the time it now takes for publications to become widely known and improve the processes of screening and editing.

- *Facilitating Long-Distance Interpersonal Interactions:* Although conferences will never disappear, direct face-to-face human interaction being best for some purposes, periodic committee meetings of university-wide committees in multi-campus universities might save time and money by 'teleconferring'. Live teleconferences might also be appropriate for consultations among medical specialists as well as for scientific work required to be done by a team over long distances.

- *Providing Better Bibliographic Services:* Even with the best bibliographic services today it will not be possible to obtain all references relevant to a given topic. J.G. Miller believes that authors and publishers will gradually learn of the possibilities of the network and will arrange for users to get access to their publications over the network, so that eventually a scholar will be reasonably certain to locate from a terminal all relevant data.

  Annual reviews, yearbooks, and encyclopaedias have an average two-year lag in providing information, which is therefore almost certain to be out of date when published. "If the task of putting in information were divided among several individuals or institutions on the network, costs could be made reasonable for all concerned and materials could be kept current within days or hours in networks with computerised information storage and retrieval systems and data banks."

  Profiles of interest of users could be used in the selective dissemination of abstracts or documents to remote terminals in on-line systems.

- *Improving Continuing Education:* As terminals of a network in operation could be installed in an office or home, users would not need to go to training centres. This would mean new life for continuing education.

- *Decreasing Administrative Delays in Higher Education:* On-line terminals could decrease delays in the transmission and handling of documents in universities, as has been experienced by industry.

- *Other Possibilities of an Information Network:* Among further advantages of an information network J.G. Miller lists: the better control of the use of copyright materials, the saving on duplicated copies (copies would be printed from the electronic store only when requested), and the guarantee of rapid access to vital information e.g. in medical emergencies.

The technical plans for EDUNET developed by the Summer Study at Boulder (26) foresaw three phases of implementation, the last of which it was hoped would extend both narrow and wide-band Pilot EDUNETs to all universities and participating organisations by the end of 1969, with satellite links expected after 1970.

It seems, though, that the development of EDUNET is not moving as fast as had been anticipated. A host of problems remains to be discussed and solved.

A. Kent pointed to the fact that before a network can be designed a test system must be operated. Before the test system must come the predictive model of the network. Before the predictive model must come a determination of what is practicable to serve present and future library needs in terms of the projected technical state-of-the-art. According to Kent, industry has agreed to prepare a report on what will be technically feasible in the next twenty years for libraries or information networks with EDUCOM co-operating in supplying data on size of libraries, users etc. (27) Nevertheless four functioning interuniversity media networks were reported on in May 1968. (28) More may have to be added by the end of 1969.

The present trend of activities of EDUCOM can be gathered from its six panels operating on a more permanent basis in place of its former task forces. The fields of activity of the panels are as follows:

Applications and utilisation area:

- The panel on *Extended Education* - concerned with the continuing education of the professional, with the resumed education of those whose education has been interrupted, and with the reeducation of those dissatisfied with their careers.

- The panel for *Libraries and Data Banks* - concerned with the utilisation of stored information in the educational process etc.

- The panel for *External Affairs* - concerned with legislation, with matters of public policy and with matters of social development that affect the educational community.

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(26) cf. BROWN, G.W., MILLER, J.G. and KEENAN, T.A., op. cit.

(27) cf. "Document vs Digitial Storage of Textual Materials for Network Operations". In: *EDUCOM*, vol.2 (1967), no.6, p.5.

(28) cf. "Functioning Media Networks". In: *EDUCOM*, vol.3 (1968), no.3, p.2-4.

Resources development area:

- The panel on *Computer Networks* - concerned with the organisational and structural interconnection of computers, the hierarchical organisation of data within them and human access to their capabilities.
- The panel on *Technologically Augmented Instruction* - concerned with the use of video recording, programmed instruction, computer-aided instruction, simulation and other such tools in ameliorating the learning process.
- The panel on *Micrographic Developments* - concerned with the utilisation of such techniques as photochromatic reproduction in storing masses of documentary information, the inter-face between such systems and the computer, the use of such micrographic images by people in their day-to-day activities. (29)

III. CONCLUSION

An attempt to survey the activities in the United States in the field of educational documentation and information leads to the general impression that a careful analysis of developments in that country could facilitate European projects in this field by founding them on a more solid basis of already available experience. A permanent interchange of experience between the US system and the projected European system will be of benefit to both. The following nine points might indicate some areas of particular interest and of discussion:

i) Through *Research in Education* and microfiches of all titles reported in it, the ERIC project makes a selected portion of information on educational research available pre-packaged to existing libraries and centres.

Until on-line access to them is possible, the availability of full texts and not only their surrogates, will have to be given special attention.

ii) As with ERIC, selection criteria will be of particular importance in a decentralised European system. As the European system might not only have to handle information on research, the selection criteria would have to be other than those used by ERIC, e.g. literature of survey report character might have to be selected.

iii) The analysis, compression, and organisation of information on research seems to require the involvement of subject-field specialists rather than generalists.

iv) The existence of SRIS beside ERIC seems to indicate the necessity of having separate networks for "research" and "development". Special market studies and studies on innovation processes will have to be made for the European system to decide on alternatives for reaching different target populations.

v) The EPIE project can be seen in line with similar European projects, e.g. that of the Institut Pédagogique National. (30) As the majority of documentation centres are concerned with the analysis of literature only, much could be profited by close co-operation between centres in trying to find criteria for different kinds of media and their areas of use.

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(29) BARUCH, J., op. cit., p.6.

(30) cf. BONNEFOI, C. elsewhere in this volume.

vi) The first ERIC Thesaurus, used also by SRIS and by EPIE, seems to have been decided on for administrative reasons to enable the launching of the project in 1964. It has been tested both in France and in Germany for its possible usefulness as an international frame of reference. It appears from this testing that the first ERIC Thesaurus seems to be inferior to the IR Thesaurus of Education Terms also developed in the United States, the development of which took from 1961 to 1968. (31) The new version of the ERIC Thesaurus, however, based on several years of experience not available to the IR Thesaurus seems to be a considerable improvement on ERIC's first version and competing with the IR Thesaurus.

vii) The use of the same thesaurus and of the same clearinghouses for the production of both *Research in Education* and of the *Current Index to Journals in Education* seems to be a good example of rationalisation of expert labour.

viii) The development of a European EDUNET, possibly on the basis of the use of satellites for educational and cultural purposes, could become a most important factor in the practical integration of higher education. It would certainly be a long-term plan. Its implementation might lead towards higher quality education for a greater number of university and college students in Europe.

ix) Though EDUNET in the United States and Canada started as a project in higher education, the network developed under this project could also facilitate continuing education (permanent education) in other fields and serve as a basis for the integration of all kinds of documentation and information activities. These activities, which include the analysis, compression, and organisation of literature in special areas, cannot however be suspended until an EDUNET comes into existence, as EDUNET serves only as a physical and organisational network requiring the prior existence of those activities.

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(31) cf. BARHYDT, G.C., SCHMIDT, C.T. and CHANG, K.T. "Information Retrieval Thesaurus of Education Terms". Cleveland: The Press of Case Western Reserve University, 1968.

APPENDIX

EVALUATION FACTORS TO BE CONSIDERED IN ESTABLISHING ERIC CLEARINGHOUSES

Administrative

a. Interest and support of administrative officials which will ensure responsiveness.

b. Over-all educational research programme of institution.

c. National Professional Association affiliation and support.

d. Prior record of contract performance.

e. Adequacy of management controls.

Subject Specialisation

a. Faculty subject strengths and interests.

b. Qualification of key subject specialists involved in proposed clearinghouse operation.

c. Reaction of other organisations with similar subject specialisations.

d. Relative standing of personnel among peers.

e. Accomplishments to date in establishing ERIC type operations.

f. Evidence of prior and long-range interest in subject area.

g. Advisory Board - its composition and degree of participation.

Technical Qualifications

a. Information retrieval capabilities:

  (1) equipment,

  (2) personnel - training and experience.

b. Quality control safeguards.

c. Technical excellence of the proposal:

  (1) Systems flow chart,

  (2) PERT schedule - proposal should contain a modified PERT schedule indicating major target dates for establishing ERIC operations,

  (3) Overall understanding of the technical aspects of the problem.

Costs

DOCUMENTATION AND INFORMATION IN THE USSR

by *K Spangenberg*

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1. DOCUMENTATION AND INFORMATION IN THE USSR

The first step towards centralisation of scientific information in the USSR was taken in 1921 when the Central Interdepartmental Commission on the Acquisition and Distribution of Foreign Literature (KOMINOLIT) was set up (1). KOMINOLIT provided for registers of the most important political, scientific and technological literature indicating libraries where the full texts could be found. During the thirties information agencies were established for the individual branches of industry. In consideration of the accelerated pace of published data the Council of Ministers of the USSR issued a decree in 1952 to establish an Institute of Scientific Information (VINITI) (2) within the framework of the Academy of Sciences of the USSR. This institute was responsible for setting up the national scientific and technical information system in the USSR based on the following principles:

" - Centralisation of the entire information network in the nation;
- Specialisation of information agencies by branches of the national economy;
- Division of tasks among the information agencies at various levels;
- Centralisation of information processing as well as of abstracting and bibliographic services for national and foreign literature;
- Direct and close co-operation between the information agencies and users of information;
- A unified reference and information system based on a nation-wide network of co-ordinated reference collections and a uniform system of classification;
- Flexibility in the forms of information services aimed at meeting the needs of various types of users of information;
- Active and constantly increasing participation of scientists and engineers in the activities of the information agencies;
- Effective international co-operation in the field of scientific and technical information." (3)

After an evaluation of the work of VINITI by a committee a reorganisation of VINITI took place in 1961. At that time, the national scientific and technical information network consisted of: (4)

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(1) See SVIRIDOV, F.A. "Scientific Information Services in the Soviet Union", in: de REUCK, A. and KNIGHT, Julie "Communication in Science: Documentation and Automation". A Ciba Foundation Volume. London: J. & A. Churchill Ltd. 1967, and ARUTJUNOV, N.B. "Die wissenschaftlichtechnische Information in der UdSSR". Berlin: Zentralinstitut für Information und Dokumentation 1968.

(2) Since 1955 = VINITI = All-Union Institute of Scientific and Technical Information.

(3) SVIRIDOV, F.A. op. cit., p.183.

(4) ARUTJUNOV, N.B. op. cit., p.7 and 8.

6 All-Union institutes

the State Public Library for Scientific and Technical Literature of the USSR

60 Central specialised agencies with respective libraries

15 Institutes and 8 scientific and technical libraries of Union Republics

38 Central offices for technical information

38 Central scientific and technical libraries with 45 branches

81 Institutions for dissemination of scientific and technical information

5,000 Offices for scientific and technical information in research institutes and in factories

50,000 Scientific and technical libraries

The reorganisation of 1961 apparently aimed at incorporating more fully the scientific and technical libraries as information agents into the system, at increasing the efficiency of the system by co-ordinating various activities under the responsibility of more highly qualified specialists, and at avoiding duplication of effort thus diminishing the total number of information media by 40% since 1962. (5)

The transformation of the economy into a system of shared responsibility according to economic branches, improvement in the preparation and implementation of plans, and efforts to use material stimulus in industrial production since the resolutions of the Central Committee of the Communist Party of the USSR in 1965, increased the importance of scientific and technical information considerably thus creating an even greater functional demand. (6) In 1966 the Council of Ministers of the USSR took a resolution "On the All-Union System of Scientific and Technical Information" serving as a programme of development. Its content has been summarised as follows:

Characteristic features of the present national system are the sub-systems of information consisting of a central documentation and information agency, of the information offices of the factories, and of research and development institutes. In order to safeguard efficiency within the sub-systems constituting the national system an exact division of labour, standards for classification and indexing literature and materials as well as for methods of information have to be observed. (7)

The central documentation and information agencies communicate directly with those institutions and researchers working in the field to obtain their data in order not to delay or lose information by having it passed on from level to level.

In 1967 VINITI had approximately 2,500 full-time scientific staff members and over 22,000 scientists as outside collaborators for abstracting work. The main functions of VINITI include:

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(5) Ibid., p.9.

(6) Ibid., p.10.

(7) Ibid., p.12.

"A thorough and comprehensive evaluation and processing of literature in all fields of science and technology published throughout the world; the preparation and publication of abstracts, reviews and bibliographies; the organisation of reference information services; making its duplicating facilities available to institutions and individuals; the co-ordination of translation work in the country; the publication of translations of the most important articles from foreign sources ('Express Information'); carrying out research projects in the field of scientific information, and co-ordination of this research on a national level; advanced training of documentalists." (8)

The most important publications of VINITI are: (9)

- *Referativnyj Žurnal*, an abstract journal issued in 16 series (astronomy and geodesy, automation and electronics, biochemistry, biology, chemistry, electrical engineering, geography, geology, geophysics, industrial economics, machine building, mathematics, mechanics, metallurgy, mining and physics).

  In 1966 the 16 series covered some 800,000 items from over 6,000 Soviet periodicals and more than 17,000 foreign periodicals, as well as books and patents issued in 71 languages (including 19 languages spoken in the USSR) in 102 countries. The abstract journal has over 200,000 subscribers, one third of them from foreign countries.

  All series of *Referativnyj Žurnal* have author indexes and annual cumulative indexes and subject indexes. The average time lag between the publication of an article in a primary journal and the publication of an abstract of this article in the journal is about four months.

- *Naučnaja i techničeskaja informacija* (Scientific and technical information), a bi-monthly abstract journal, covering theory, methods and practical aspects of scientific and technical information. An English language version of this journal has been published since 1966.

- *Naučno-techničeskaja informacija* (Scientific and technical information), a monthly journal published in two series: organisation and methodology of information work, and information processes and systems.

- *Ekspress-informacija* (Express Information), published weekly in some 60 series, 48 issues annually, containing five to eight abstracts or brief translations of important foreign literature (articles and patent specifications) in fields such as astronautics and rocketry, computer technique, radio engineering and eletronics, railway transport, scientific information etc. Thus readers of each series obtain 300 to 500 translations annually. Abstracts and translations appear in *Ekspress-informacija* approximately a month after the publication of the original. *Ekspress-informacija* has over 100,000 subscribers.

- *Itogi nauki i techniki* (Achievements in Science and Technology), published annually, containing surveys of the most important developments in a given branch of science and technology. In 1965 - 1966 *Itogi nauki i techniki* contained over 90 review publications with one or more survey articles on sixteen main subjects (see the sixteen series of *Referativnyj Žurnal*).

VINITI is preparing an annotated list of world scientific periodicals (in seven volumes) covering some 15,000 major foreign periodicals and serials. Furthermore VINITI has published a multilingual dictionary of the terminology of scientific information with definitions in Russian, Bulgarian, Czech, German, Hungarian, Polish, Rumanian and Slovak.

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(8) SVIRIDOV, F.A. op. cit., p.186.

(9) Ibid., p.186 - 188.

VINITI also has a bibliographic card service covering articles published in foreign periodicals and serials, each card containing a Russian translation of the title of the article.

Details of the organisational structure of VINITI are shown in the accompanying diagram.

Besides VINITI the following other documentation and information centres in the USSR should be mentioned:

- The All-Union Research Institute of Medical and Medico-Technical Information (VNIIMI)
- The All-Union Research Institute of Technical Information, Classification and Coding (VNIIKI)
- The All-Union Institute of Scientific and Technical Information on Agriculture (VINTISH)
- The Central Institute of Scientific Information on Building and Architecture (CINIS)
- The Central Research Institute of Patent Information (CNIIPI)

2. EDUCATIONAL DOCUMENTATION AND INFORMATION

The Academy of Education of the Russian Socialist Federal Soviet Republic has been producing the following publications:

- *Bibliografija izdanij Akademii pedagogičeskich nauk RSFSR* (Bibliography of the Academy of Education of the RSFSR). Published annually since 1962, from 1954 - 1962: *Literatura po pedagogičeskim naukam.*
- *Pedagogika i narodnoe obrazovanie v zarubežnych stranach. Sbornik referator.* (Education abroad), an abstract journal covering educational developments in the world.
- *O novych issledovanich v pedagogičeskich naukach* (New research in education), containing reports on new research of the Academy of Education of the RSFSR, issued four times annually.

In 1967 the All-Union Academy of Education of the USSR was founded with plans for an Institute for Educational Documentation and Information.

In 1967 the Central Committee of the Communist Party of the USSR decided on measures for the further development of the social sciences, (10) including the content and methods of communist education. (11) As well as increasing research in such fields as economics, socialist democracy, organisation of labour, education etc., the establishment of a special institute for scientific information in the field of social sciences was planned.

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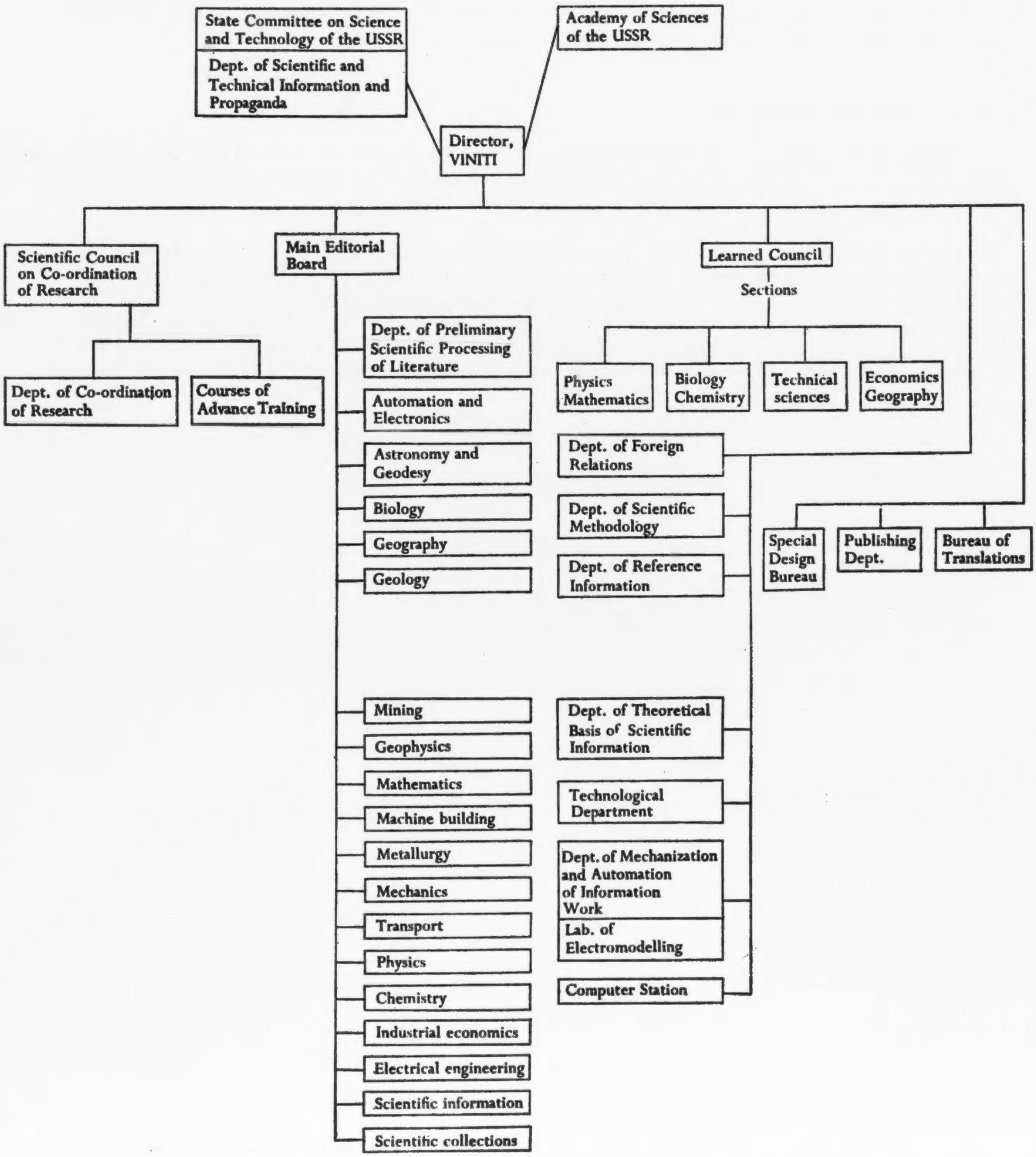
(10) The contents of the social sciences in the USSR differ from their definition in Western countries.

(11) ARUTJUNOV, N.B. op. cit., p.24.

Fig. 1. The Structure of VINITI


State Committee on Science and Technology of the USSR
Dept. of Scientific and Technical Information and Propaganda
Academy of Sciences of the USSR
Director, VINITI
Scientific Council on Co-ordination of Research
Dept. of Co-ordination of Research
Courses of Advance Training
Main Editorial Board
Dept. of Preliminary Scientific Processing of Literature
Automation and Electronics
Astronomy and Geodesy
Biology
Geography
Geology
Mining
Geophysics
Mathematics
Machine building
Metallurgy
Mechanics
Transport
Physics
Chemistry
Industrial economics
Electrical engineering
Scientific information
Scientific collections
Learned Council
Sections
Physics Mathematics
Biology Chemistry
Technical sciences
Economics Geography
Dept. of Foreign Relations
Dept. of Scientific Methodology
Dept. of Reference Information
Dept. of Theoretical Basis of Scientific Information
Technological Department
Dept. of Mechanization and Automation of Information Work
Lab. of Electromodelling
Computer Station
Special Design Bureau
Publishing Dept.
Bureau of Translations

From: de REUCK, A. and KNIGHT, Julie (Eds.) "Communication in Science: Documentation and Automation", facing p. 188.

Considering the efficiency of VINITI as a well established documentation and information centre for science and technology the development of a comparable centre for the social sciences will be a most interesting endeavour to follow. It is not yet discernible how far the integration of the Institute for Educational Documentation and Information of the All-Union Academy of Education into this wider frame would go. In any case further promotion of educational documentation and information in the USSR will be able to profit by the fact that a well organised information service for teachers has already been established with provision for teachers to be released to spend time on their further education.

3. COMPUTERISED DOCUMENTATION

These developments in documentation and information in education and in the social sciences seem to coincide in the USSR with a transfer to computerisation in documentation and information planned and sponsored by VINITI.

It is planned that by 1970 the first level of automation in the field of technological and scientific documentation and information will be reached with 31 centres and institutes participating in experiments. (12) As regards machine translation there seem to be more projects in the USSR than in any other country. (13) The automation of documentation and information both in the social sciences and in education might be patterned according to the experiences of VINITI in the field of science and technology.

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(12) Ibid., p.19.

(13) MILLER, J.G. in: de REUCK, A. and KNIGHT, Julie "Communication in Science: Documentation and Automation", p.196 (Discussion).

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Born 1921. Passed his Abitur in 1939, studied English, German, History, Psychology and Education and gained his PhD with a thesis on "Group Dynamic Models for Education". Co-author of a series of textbooks for teaching English to German students, has translated several books from English into German and written some 150 broadcast scripts on educational topics.

From 1950 to 1965 Mr. Spangenberg was Director of the Pädagogische Arbeitsstelle, Berlin (Educational Service Centre). He has been Director of the Library and Documentation Department of the Pädagogisches Zentrum, Berlin, since its foundation in 1965.